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EDITOR'S COMMENT

FOR many years the editors of *Surgery, Gynecology and Obstetrics* have attempted through the International Abstract of Surgery to furnish its readers readable and trustworthy abstracts of the world's best surgical literature. With few exceptions these abstracts have been prepared by practicing surgeons and a multitude of favorable comments from year to year have stimulated the editors to attempt constantly to improve the quality of the material presented and to make as certain as possible that no worth while contributions to surgical thought were overlooked. From time to time collective reviews on important subjects have been presented, and these reviews for the most part have been collective rather than critical in other words the author has attempted to present fairly and without bias the views of the various surgeons whose work and opinions were reported and has not presumed to pass judgment favorable or unfavorable upon them.

In accordance with the expressed wishes of a considerable group of our subscribers whose opinions were sought the bibliography of current literature will be discontinued and the space thus made available devoted to the presentation of additional abstracts and reviews.

Beginning with this issue two new features are being added to those which have become definite and permanent parts of the Abstract. Under the title *Surgery and the Basic Sciences* there will appear every second month a review of recent experimental work in physiology, biochemistry, pathology, and allied sciences which is of interest to the thoughtful surgeon, and in reviewing such work the editor will attempt to point out the significance and possible application of the study in question to practical surgical problems. It is hardly necessary to point out the value of an authoritative review covering the subjects in question nor to remind our readers how closely

surgical progress is linked with the developments that are taking place in the field of experimental medicine and surgery. Obviously the preparation of such a review requires an extensive knowledge of the basic sciences, a wide experience in experimental surgery, and an intimate acquaintance with the problems of clinical surgery. It is our good fortune and that of our readers to have obtained the consent of Dr. Andrew C. Ivy, Professor of Physiology at Northwestern University Medical School to assume the responsibility of editing this bimonthly review.

Under the title 'Principles of Surgical Practice' there will appear on alternate months a discussion of important clinical problems with particular reference to physiology, pathology and treatment. It is our belief that one must look backward from time to time at the methods, the successes and failures of the past and try to determine on the basis of known physiological and pathological facts whether present day treatment is logical, well considered and effective, and in what ways it can be improved. This questioning attitude is of particular importance with reference to the common everyday problems of surgical practice so often met and dealt with in routine fashion and sometimes in a fashion that seems to ignore completely underlying and well established surgical principles. The problems of wound healing and of infection, osteomyelitis, the treatment of raw surfaces, of burns, of simple and compound fractures, of acute appendicitis, of acute cholecystitis, the choice of anesthetic, pre-operative preparation and postoperative care — are only a few of many important subjects that seem to us to call again for thoughtful and serious consideration.

In looking backward over these problems it will be our effort to present discussions by men of wide clinical experience and to emphasize particularly the question of surgical treatment.

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INTERNATIONAL ABSTRACT OF SURGERY

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THE APPLICATION OF RECENT CONTRIBUTIONS IN BASIC MEDICAL SCIENCES TO SURGICAL PRACTICE

A. C. IVY, M.D., Chicago, Illinois

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The enormous volume of literature appearing in the numerous basic science journals each month contains information of interest to the medical profession. The busy physician, however, is severely taxed to keep abreast of the purely clinical literature, and finds little time to devote to an inspection of the growing basic science literature. It is the purpose of this series of reviews to present to the interested physician selected pertinent material from the field of the basic sciences in order to aid him in his practice and in his investigations. The source material for these reviews will consist of approximately fifty journals

dealing with the subjects of physiology, anatomy, pathology, biochemistry, and bacteriology. These articles will appear bimonthly and will accordingly cover the publications of the previous two months. The aim will be to review in each number nearly the whole of the field in order to keep the content thoroughly up-to-date, and to provide material of interest to the largest number of readers. However, limitations of space and a reluctance to sacrifice clarity for brevity may occasionally prevent the attainment of this aim. The comments, criticisms, and attempts toward synthesis and correlation should be considered as suggestions and not as factual contributions.

GASTRO-INTESTINAL TRACT

UNNEUTRALIZED GASTRIC JUICE AND GASTRO-DUODENAL ULCER

SOME maintain that unneutralized gastric juice of high acidity is the sole cause of duodenal and postoperative jejunal ulcer. Although much evidence indicates that unneutralized gastric juice is an important, if not a prime, factor contributing to the chronicity of peptic ulcer, it cannot be stated as proved that gastric juice is the factor initiating peptic ulcer. The idea that unneutralized gastric juice is the initial cause of peptic ulcer received support from the results of some experiments several years ago (1). Dogs were "sham fed" so that gastric juice was secreted by the stomach without being buffered by food. Ulcers of the stomach and duodenum, acute in type, were

observed to result. This work has been repeated recently (2) with negative results. Gastric secretion was maintained at a high level for from ten to twelve hours each day for a period of from twenty to one hundred and two days. In this recent work the dogs were maintained in good condition by careful feeding during the times that sham feeding was not being practiced. Special attention was given to this factor because the type of ulcers previously reported to occur were of the acute type which are associated with vomiting and malnutrition. It is pointed out that in a consideration of the pathogenesis and treatment of peptic ulcer one must consider the processes concerned with tissue protection and repair as well as the processes concerned with tissue destruction. The negative results obtained confirm those recorded in a previous report (2a).

Nathan Smith Davis, Professor of Physiology and Pharmacology, Northwestern University Medical School

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ACTION OF MORPHINE ON THE SMALL INTESTINE

For a long time a conflict existed between the clinical and laboratory observations pertaining to the effects of morphine on the intestine. This conflict has been, in part, if not entirely, annulled by the observation that in animals morphine first increases the propulsive motility for a short period from fifteen to twenty minutes, and then markedly decreases it for a period of one hour or longer (3). An increase in intestinal tone, non propulsive motility, occurs throughout the duration of the morphine effect. These observations have been confirmed recently (4). It has also been found that atropine, given just before the morphine prevents the temporary increase in propulsive motility, but has no effect on the increase in the tone of the intestine caused by morphine. Obviously the decrease in propulsive motility after morphine would tend to constipate. To this factor must be added the fact that morphine also tends to constipate by depressing the central mechanism responsible for the perception of the sensation of the 'call to stool'.

MESENTERIC VASCULAR OCCLUSION

Occasionally clinical reports appear in the literature in which spontaneous recovery from a mesenteric vascular occlusion without gangrene is described. Such observations are elucidated by a recent study (5) of the collateral circulation in the intestine of the rat. Twelve of the usual sixteen vessels in the mesentery of the intestine of the rat were ligated. Infarction or ill effects occurred in only one animal. This result was due to the development of preexisting collateral vessels, capillary plexuses, and anastomotic connections.

Observations on the extent to which the mesenteric vessels of the dog or monkey may be occluded without harm are not available in the indexed literature. At least two-thirds of the blood supply of the stomach may be ligated in the dog without harm (5). The exact extent to which a collateral circulation adequate for function may develop in the gastro-intestinal tract of man is uncertain. In the intestine, stricture frequently occurs at the site of a previous mesenteric occlusion not subjected to operative intervention. Recovery in man has occurred in the presence of occlusion of the superior mesenteric artery and in which in stance all of the cyanosed gut was not excised (6).

Another point worthy of mention in connection with the foregoing observations is that exsanguination or bleeding into the obstructed loop from the non obstructed loops of bowel may occur and contribute to the production of shock. Such a possibility should be avoided when excising a loop of

normally vascularized intestine. It usually is avoided in practice by the application of suitable intestinal clamps before the blood supply of the loop to be excised is ligated.

VOMITING FROM OCCLUSION OF A MESENTERIC BUT NOT THE SPLENIC VEIN

As is well known, nausea and vomiting, in addition to pain, are very frequent and early symptoms of occlusion of the mesenteric veins of the gut. Pain, accompanied by enlargement of the spleen, is an early and outstanding symptom of splenic thrombosis but nausea and vomiting are not listed usually as early symptoms in textbooks of surgery and medicine. This is a point usually not considered in differential diagnosis. In this connection observations on the cat (7) show that vomiting occurs almost immediately after ligation of the mesenteric, but not the splenic vein. It should be recalled that vomiting is a characteristic symptom in fulminating obliterating endophlebitis of the hepatic veins and of cirrhosis. A venous spasm may be produced experimentally may last for a considerable period, and completely arrest the outflow of blood from a part (8).

A REFLEX FROM THE BLADDER AND RECTUM TO DIAPHRAGM

A reflex viscerodiaphragmatic from the biliary tract to the diaphragm, which explains the contraction, relative fixation or 'splinting effect' of the right side of the diaphragm in gall stone colic, was shown to exist in animals several years ago. Now it has been shown (9) that compression of a distended urinary bladder or the passage of feces into the rectum causes the diaphragm and abdominal muscles to contract reflexly (visceroskeletal reflex). The existence of such reflexes viscerodiaphragmatic and visceroskeletal, was determined in the decerebrate cat. The reviewer has seen them in lightly anesthetized dogs. Sensory nerve endings for the elicitation of such a reflex must also be present in the cervix or perineal structures because in the lightly anesthetized animal or human being in labor bearing down occurs. One wonders whether or not the condition called pseudopregnancy, pseudocystitis or phantom tumor with abdominal distension and lordosis occurring sometimes only after eating and generally diagnosed as neurosis, when associated with megacolon constipation and the enema habit may not in part be due to the involvement of such a reflex. In late pregnancy the vesical and bladder reflexes to the diaphragm and abdominal muscles tend to be depressed or their production is more difficult. This may in part explain the in

complete emptying of the bladder and that of the colon that sometimes complicate pregnancy.

THE OXYGEN SUPPLY OF THE LIVER

Occasionally as the result of a surgical accident, a branch of the portal vein or hepatic artery is cut and ligated. Under such circumstances a question arises in regard to the extent of the ensuing hepatic damage. Although there is a rather extensive literature on the subject, the recent work of McMichael (10) is of particular interest because he studied the changes in the oxygen supply of the liver after various degrees of occlusion of the portal and arterial blood supply of the liver. In the cat about two-thirds of the oxygen supply of the liver is derived from the blood of the portal

vein, and obstruction of the portal vein to a lobe of the liver causes central lobular degeneration. Hemorrhage and shock, of course, contribute to the damage. The liver of the rabbit, however, is almost entirely dependent on the oxygen supply derived from the hepatic artery and the degenerative changes are more severe. Such differences in species render it difficult to apply results of partial occlusion of the portal and arterial supply of the liver to man. Yet, the general concept that the degenerative change is proportional to the reduction of oxygen supply is important, since it has been shown that the human liver parenchyma receives chiefly venous blood (62) and therefore probably has a narrow factor of safety in regard to its oxygen supply.

THYROID GLAND

SECRETORY INNERVATION OF THE THYROID GLAND

Whether the nerves of the thyroid gland influence its secretion is an unsettled question. However, as long as psychic traumas continue to appear to play a definite rôle in initiating or exaggerating an attack of Graves' disease, this question should challenge investigation.

A direct attack on the problem has not been undertaken since the interesting and apparently significant observations of Haney (11) were reported in 1932. Haney determined the metabolism of a group of rabbits, and then stimulated the cervical sympathetic nerve on one side for from one to three hours. Five days later the metabolism was elevated about 22 per cent, reached a height of 29 per cent from the eleventh to the fifteenth day, and then returned to normal from the forty-first to the sixtieth day. When the nerve was stimulated in the absence of the thyroid lobe on the side stimulated, no change occurred in the metabolism.

It is difficult to interpret Haney's results on any other basis than that the cervical sympathetic trunk contains nerves which have a secretory effect on the thyroid. His results tend to confirm the older work of Cannon, Binger, and Fitz (12), in which an increase in the metabolism and symptoms of Graves' disease were observed in cats with an anastomosis of the phrenic nerve with the cervical sympathetic.

Recent observations (13-17) on the innervation of the anterior lobe of the hypophysis may in time modify our concept of how nervous influences modify the activity of the thyroid. It is known that the anterior lobe produces a thyrotropic or a thyroactivating hormone; that is upon injection

in various animals certain extracts of the anterior lobe cause a hyperplasia of the thyroid gland with a concomitant decrease in its content of colloid and iodine and an increase in the blood iodine and the basal metabolism (18). Further, it is known that the act of copulation in the pigeon leads to a development of the crop gland which is due to the hormone prolactin secreted by the anterior lobe, of both the female and male (19). The only way such a phenomenon can be accounted for at present is on the basis of a nervous secretory activation of the anterior lobe. In the rabbit ovulation occurs about ten hours after copulation, even when the buck is vasectomized. The process of ovulation is dependent on the integrity of the anterior lobe, and it is difficult to conceive how the activity of the anterior lobe could be affected in this instance except through a secretory innervation of the anterior lobe (13), or through a reflex excitation of some other gland of internal secretion. Thus, it is evident that in future investigations of the existence of a secretory innervation of the thyroid gland, one must consider the rôle that the anterior lobe may be playing. Also, in considering how psychic traumas may influence the activity of the thyroid, the thyrotropic activity of the anterior lobe must not be overlooked.

Other evidence which supports the idea of the involvement of the autonomic nervous system in the genesis of Graves' disease is the observation of Uhlenhuth (20), that the administration of pilocarpine or epinephrine sensitizes the thyroid gland to the action of the thyrotropic hormone.

It now appears to be established through experimental and clinical experience that the hyperthyroid heart is sensitive to epinephrine. A recent investigation (21) presents quantitative

data showing that smooth muscle denervated and normal becomes more sensitive after thyroid administration. The action of exogenous epinephrine on sensitized and normal smooth muscle is diminished by thyroidectomy, gonadectomy, and adrenalectomy.

EXOPHTHALMOS

The type of histopathological changes observed most frequently in the orbital structures in the presence of thyroid dysfunction with exophthalmos in man has been produced experimentally in the guinea pig (22, 23). On the basis of experimentally produced exophthalmos, it would appear that two types of exophthalmos may be associated with thyroid dysfunction, namely, a functional type and an organic type. The functional type can be produced temporarily during the excitation of the cervical sympathetic in those animals which have considerable smooth muscle in their orbits. It can be produced also by the injection of thyrotropic hormone into ducks, guinea pigs, and rabbits (24-27), even in the absence of the thyroid gland. In fact, it appears as if hypothyroidism predisposes to the development of exophthalmos (26, 28, 29, 30), and that the administration of desiccated thyroid temporarily increases the proptosis (p. 30). At first, the exophthalmos produced appears to be strictly functional in type because it disappears with anesthesia and death, and can be relieved by excision of the superior cervical sympathetic ganglion (30). However, according to Smelser (22) and Paulson (23), the continued injection of the thyrotropic hormone over a prolonged period leads to organic changes, edematous and lymphoid infiltrations of the orbital tissues and extra ocular muscles, analogous to the changes observed in exophthalmos in man (31, 32). Smelser reports that removal of the cervical sympathetic ganglion (he does not state which one) in guinea pigs prevents to some extent the organic type of exophthalmos which he produced. Paulson reports that the lacrimal gland shows degenerative changes as well as the other orbital tissues. The condition of the superior cervical sympathetic ganglion which has been found to manifest degenerative changes in exophthalmic goiter in man (33), is not mentioned in any of the recent experimental studies.

In regard to therapy the experimental observations (34-37) confirm the clinical in showing that desiccated thyroid or thyroxin and iodine constitute the most beneficial medical treatment of exophthalmos. Experimental observations *vide ut supra* suggest that the extent of the relief of exophthalmos that might be obtained by excision

of the superior cervical sympathetic ganglion (Jaboulay) might be determined beforehand by subjecting the patient to deep anesthesia. Such a procedure might possibly be justified before the more extensive operation of Naffziger is employed.

The literature is divided in regard to the effect of excision of the cervical sympathetic nerve on the histology of the thyroid gland; some observers reporting atrophy and others reporting no significant change. A more recent article (38) reports that in rabbits bilateral cervical ganglionectomy first shows evidence of hyperplasia and the reduction of colloid followed by involution and the storage of colloid. This is of interest because when the vessels of the superior poles of the thyroid are ligated the nerves are included. Autografts of the thyroid in guinea pigs, however, show the well known changes characteristic of involution following the administration of iodine or thyroxine (39). Autografts also respond to the thyrotropic hormone (40).

THYROID AND BRAIN

The effect of the administration of desiccated thyroid on the electro-encephalogram has been studied recently. Electro-encephalography is a recent development in physiology. When suitable electrodes are placed in contact with the skull and are connected to a sensitive recording apparatus characteristic rhythmic waves denoting a change in potential are recorded. The so-called alpha rhythm, which occurs at a frequency of 10 per second, arises from the occipital cortex. It occurs when the eyes are closed, but is abolished by visual activity or mental effort. The rate is reduced during sleep and during an epileptic seizure the rate is reduced and the amplitude markedly increased. The rate of the waves under standard conditions appears to be related to the rate of respiration and the metabolism of the brain cells. If the blood sugar is lowered with insulin, for example, the frequency of the waves diminishes. An increase in the basal metabolism rate of from 25 to 50 per cent by thyroxin increases the frequency of the waves from 5 to 17 per cent and thyroxin increases the rate of metabolism of the brain (41).

LIVER AND THYROID

It is generally recognized that hepatic insufficiency exists and degenerative changes may occur in the liver in hyperthyroidism. It has recently been shown that when thyroxin is given to rabbits in doses insufficient to cause histological hepatic damage the elimination of injected bile salt is markedly diminished but the normal volume output of bile and bile salt is not disturbed (42).

The older work which shows that the feeding of desiccated thyroid reduces the liver-glycogen content in a large variety of animals has been recently confirmed (43). In addition it has been shown that the administration of Vitamin B, also G, protects the liver from the deglycogenizing effect of thyroxin (43). The animals also maintain their weight to a greater extent. This work recalls the well known contention of Weiss, "Vitamin B deficiency in hyperthyroidism may be an important factor in explaining some of the bad operative results due to cardiac disturbance, and at the same time explain why some patients with hyperthyroidism have cardiac dilatation and cardiac symptoms." The cardiac disturbances in polyneuritis and pellagra are quite analogous to those in hyperthyroidism. A Vitamin B or G complex deficiency should be suspected in patients whose appetite is poor, whose diet is limited by poverty or dietary habits, and who have diarrhea.

An article pertaining to the alleged antithyroidic action of Vitamins A, C, and D and of

calcium has not appeared in the recent literature. However, obviously, when the metabolism of the body is going at a more rapid rate than normal an extra supply of vitamins in the diet should be of value. Excessive calcium elimination in Graves' disease and the sedative action of this element on nervous tissue suggest that attention should be given to the patient's calcium intake.

In hyperthyroidism there is no strict relation between the impairment of liver function as judged by the blood bilirubin and bromsulphthalein retention (44) and the reaction of the patient to an operation for thyroid crisis, neither does there appear to be an agreement in regard to the results of Quick's hippuric-acid test of liver function and the reaction of the patient to an operation. Also, the determination of blood sodium appears to be of no value in determining the extent of hepatic damage in thyrotoxicosis (45, 46). Yet, the concept that the liver may be primarily at fault in the intoxication of a thyroid crisis is worthy of further investigation.

ADRENALS

There are reasons to believe that in recent months improvements have been made in the potency of the extracts of the adrenal cortex, or cortin, available on the market. Such extracts have not yet been accepted for inclusion in the New and Non-official Remedies. The reason is that it has been difficult in the past to prepare routinely a preparation of cortin of reliable or standard potency.

The expense of cortin is a serious practical disadvantage in regard to its use. An orally administered glycerol extract, which was used earlier and apparently successfully by Obrigia, Stewart and Rogoff, and others, is reported to be effective in animals and patients by Hartman, Thorn, and Durrant (47). It is less expensive but not as potent as the purer extracts, and can be used for maintenance but not for the treatment of severe adrenal insufficiency.

Before using a preparation of cortin, physicians would do well to obtain from the manufacturer the evidence for the potency of the extract. The only universally accepted evidence of potency of an extract of adrenal cortex is its ability to maintain totally adrenalectomized cats and dogs alive.

There are several recent reports in which cortin has been used to relieve muscular fatigue, in shock, in intestinal obstruction, and to increase resistance to toxins. It is true that cortin improves the work capacity of the muscles of adrenalectomized animals and patients with Addison's

disease, but the reports concerning the value of cortin in shock do not present enough acceptable evidence to warrant serious consideration.

The importance of high sodium and low potassium intake in reducing the requirement of cortin experimentally and clinically appears to be established. A high sodium and low potassium intake alone will not maintain perfect health in adrenalectomized animals or patients with adrenal insufficiency. The mechanism by which the adrenals affect the sodium and potassium balance is not known. It has been thought by some that death from adrenal insufficiency was due to potassium intoxication. Recently published data indicate that the kidney is not directly involved in the disturbance of the sodium and potassium balance. A recent article (48) suggests that serum potassium, which is usually increased in both adrenal and renal insufficiency, is not the sole cause for the death in adrenal insufficiency (see 49 also).

Several steroid compounds, related to sterols, have been isolated from the adrenal cortex, and the possible rôle that the adrenal cortex plays in animal economy is becoming more complex. The preliminary results indicate that the adrenal cortex may take a position second to the hypophysis in importance among the endocrine glands.

Compounds have been isolated from the cortex which possess androgenic potency, that is, they stimulate male-sex characteristics. A recent article (50) reports the isolation of an acid sodium

data showing that smooth muscle, denervated and normal becomes more sensitive after thyroid administration. The action of exogenous epinephrine on sensitized and normal smooth muscle is diminished by thyroidectomy, gonadectomy, and adrenalectomy.

EXOPHTHALMOS

The type of histopathological changes observed most frequently in the orbital structures in the presence of thyroid dysfunction with exophthalmos in man has been produced experimentally in the guinea pig (22, 23). On the basis of experimentally produced exophthalmos, it would appear that two types of exophthalmos may be associated with thyroid dysfunction, namely, a functional type and an organic type. The functional type can be produced temporarily during the excitation of the cervical sympathetic in those animals which have considerable smooth muscle in their orbits. It can be produced also by the injection of thyrotropic hormone into ducks, guinea pigs, and rabbits (24-27), even in the absence of the thyroid gland. In fact it appears as if hypothyroidism predisposes to the development of exophthalmos (26, 28, 29, 30), and that the administration of desiccated thyroid temporarily increases the proptosis (29, 30). At first the exophthalmos produced appears to be strictly functional in type because it disappears with anesthesia and death, and can be relieved by excision of the superior cervical sympathetic ganglion (30). However, according to Smelser (22) and Paulson (23) the continued injection of the thyrotropic hormone over a prolonged period leads to organic changes, edematous and lymphoid infiltrations of the orbital tissues and extra ocular muscles analogous to the changes observed in exophthalmos in man (31, 32). Smelser reports that removal of the cervical sympathetic ganglion (he does not state which one) in guinea pigs prevents to some extent the organic type of exophthalmos which he produced. Paulson reports that the lacrimal gland shows degenerative changes as well as the other orbital tissues. The condition of the superior cervical sympathetic ganglion which has been found to manifest degenerative changes in exophthalmic goiter in man (33), is not mentioned in any of the recent experimental studies.

In regard to therapy the experimental observations (34-37) confirm the clinical in showing that desiccated thyroid or thyroxin and iodine constitute the most beneficial medical treatment of exophthalmos. Experimental observations *vide ut supra* suggest that the extent of the relief of exophthalmos that might be obtained by excision

of the superior cervical sympathetic ganglion (Jacoboulay) might be determined beforehand by subjecting the patient to deep anesthesia. Such a procedure might possibly be justified before the more extensive operation of Naffziger is employed.

The literature is divided in regard to the effect of excision of the cervical sympathetic nerve on the histology of the thyroid gland. Some observers reporting atrophy and others reporting no significant change. A more recent article (38) reports that in rabbits bilateral cervical ganglionectomy first shows evidence of hyperplasia and the reduction of colloid followed by involution and the storage of colloid. This is of interest because when the vessels of the superior poles of the thyroid are ligated the nerves are included. Autografts of the thyroid in guinea pigs, however, show the well known changes characteristic of involution following the administration of iodine or thyroxin (39). Autografts also respond to the thyrotropic hormone (40).

THYROID AND BRAIN

The effect of the administration of desiccated thyroid on the electro-encephalogram has been studied recently. Electro-encephalography is a recent development in physiology. When suitable electrodes are placed in contact with the skull and are connected to a sensitive recording apparatus, characteristic rhythmic waves denoting a change in potential are recorded. The so-called alpha rhythm, which occurs at a frequency of 10 per second, arises from the occipital cortex. It occurs when the eyes are closed, but is abolished by visual activity or mental effort. The rate is reduced during sleep and during an epileptic seizure the rate is reduced and the amplitude markedly increased. The rate of the waves under standard conditions appears to be related to the rate of respiration and the metabolism of the brain cells. If the blood sugar is lowered with insulin for example, the frequency of the waves diminishes. An increase in the basal metabolism rate of from 25 to 50 per cent by thyroxin increases the frequency of the waves from 5 to 27 per cent and thyroxin increases the rate of metabolism of the brain (41).

LIVER AND THYROID

It is generally recognized that hepatic insufficiency exists and degenerative changes may occur in the liver in hyperthyroidism. It has recently been shown that when thyroxin is given to rabbits in doses insufficient to cause histological hepatic damage the elimination of injected bile salt is markedly diminished but the normal volume output of bile and bile salt is not disturbed (42).

stances from the blood of animals or patients with hypertension. The results reported are conflicting and no explanation for the differences is apparent. Obviously hypertensive substances should exist in the blood in detectable amounts if the hypertension produced is not reflex in nature, which fact seems to be established. Recently (59, 60) it has been reported that the kidneys of hypertensive patients contain more pressor substance than kidneys from non-hypertensive patients. The pressor substances were extracted and tested by intravenous injection. It has been known for a long time that kidneys and even other tissues yield pressor substances when extraction is properly done. The kidney, however, is the only organ so far examined in which the constriction of the arterial supply will lead to persistent hypertension. Regardless of this report (59), questions still remain: why cannot definitely detectable amounts of pressor substance be found in the blood of hypertensive patients and dogs? Is it because of the use of inadequate methods, or is it due to the possibility that in the presence of an ischemic kidney, substances which do not have a direct pressor action and are normally eliminated in the urine, acting over a period of days, produce degenerative changes in, or cause a contraction and relative fixation of, the myoplasm of the smooth muscle of the arterioles? In other words, may not the substance responsible for the hypertension be of the nature of an "arteriolar toxin" rather than of the nature of a vasoconstrictor substance in the ordinary sense. Another possibility that has not been attacked experimentally is that the hypothetical pressor substance acts on the prevertebral ganglia, such as the celiac and mesenteric ganglia.

If the hypothetical pressor substance is present in excess in the hypertensive kidney, it is reasonable to believe that one of the possible factors responsible for its excess is low renal oxygen tension. This possibility has been investigated, and it has been found that the renal arteriovenous oxygen differences are the same in dogs with and without hypertension (60).

An article by Farr and Smadel (61) is only indirectly concerned with the subject of the kidney and hypertension, nevertheless, it is important. A nephritis was produced in rats by the injection of a nephrotoxic serum. The rats were then divided into three groups in regard to diet. One group received a low protein diet, 5 per cent, another, a diet containing 18 per cent protein, and still another, 40 per cent protein. In the 16 animals on the low protein diet, the nephritis diminished or disappeared in all but two, leaving scars

The animals on the higher protein diets died from chronic progressive nephritis with anemia and polyuria. Generalized vascular lesions which resulted in secondary degenerative changes especially in the heart were found in most of the animals on the high protein diet.

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salt of palmitic acid from adrenal cortex which activates the male sex hormone. These findings may explain the sexual procreancy sometimes observed in the presence of tumors of the adrenal gland. Some of the other interrelationships claimed to exist will be briefly mentioned. (41) Extracts from the anterior lobe of the hypophysis prolong the life of adrenalectomized animals and benefit patients with Addison's disease. The adrenals contain progestational and estrogenic principles. In adrenal virilism in women a large amount of estrogenic hormone is excreted in the urine. Extracts of the adrenals of the horse or kangaroo have a gonadotropic effect in that they cause ovulation and corpora lutea formation in the immature rat.

Such extracts have not been assayed in hypophysectomized animals and hence they may affect the hypophysis rather than the gonads directly. However, the adrenotropic hormone of the anterior lobe of the hypophysis acts on the seminal vesicles of castrated rats by way of the adrenal cortex, since no effect is obtained in the absence of the adrenals. (52) The ketonuria and glycosuria of depancreatized animals is reduced by adrenal ectomy. A recent article (53) confirms earlier reports on the reduction of liver fat, which is related to the development of ketosis after adrenalectomy. An article of immediate interest on the interrelation of the adrenal cortex with the thyroid has not been published recently.

With such an array of activities the adrenal cortex assumes an important place in the endocrine system. However, we should hold fast to

that which is proven, namely, that a potent preparation of cortin maintains the life of adrenalectomized animals and rehabilitates and prolongs the life of patients with Addison's disease. A knowledge of the numerous activities of the adrenal cortex should help us to understand the symptoms of Addison's disease and other abnormalities of the organ. We should not permit the true and false messages, frequently in code, coming with the ebb and flow of the literature in this and other fields of endocrinology to confuse and discourage us. In time the true messages will be deciphered and recognized.

To those who would denervate the adrenals for the treatment of various diseases, the report that the adrenal nerves of cats regenerate in four months (54), even after removal of the lower thoracic and upper lumbar sympathetic chain will be of interest.

To those who should desire to test the blood of patients manifesting paroxysmal hypertension with or without pheochromocytoma, it will be interesting to know that Rogoff (55) has reported a method for detecting small amounts of epinephrine in blood serum. He employs the sensitized denervated iris or miculating membrane of the cat. The method however is quite technical.

The relatively old observation of Cannon and others that the adrenal medulla is essential for the production of emotional hyperglycemia has been confirmed recently. In fact, it is reported that after destruction of the adrenal medulla the blood sugar may fall in response to emotional excitement (56).

KIDNEY AND HYPERTENSION

The fact that hypertension can be produced in some dogs by constricting the main renal arteries renders it possible to study the mechanism of the hypertension so produced. After section of the splanchnic nerves or removal of the sympathetic nervous system combined with denervation of the heart the hypertension persists. However the blood pressure changes recently reported by Freeman and Page (*Am Heart J* 1937, 14 405), are not very convincing. It might be added that many of the methods for determining the blood pressure of unanesthetized animals are faulty.

It has been reported recently (57) that following hypophysectomy in hypertensive animals the blood pressure returns gradually to a normal level in about twenty days. After the pressure has been lowered it may again be elevated at times only temporarily by tightening the constricting clamps on the renal artery. The hypothesis advanced to

explain the observation is that hypophysectomy alters the reactivity of the vascular system by producing atrophic changes in the adrenal gland, thyroid gland, and possibly other organs so that the vascular system does not respond to the chemical stimuli which arise as a result of the ischemia of the kidney. In this connection Goldblatt (58) has recently reported that bilateral adrenalectomy without supportive or substitution therapy with cortin interferes with the development of hypertension. When adequate supportive and substitution therapy was given a moderate hypertension was observed. Cortin of course, is not *per se* a vasopressor substance, but its presence appears to be necessary for the action of the hypertensive chemical substances resulting from renal ischemia.

Numerous attempts have been made to isolate the hypertensive substances or group of sub-

SURGERY OF THE HEAD AND NECK

MODERN MANAGEMENT OF THE FRACTURED NOSE

Collective Review

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A REVIEW of the recent literature reveals an almost unanimous opinion that fractures of the nose are becoming more frequent, more severe, and more devastating in their end-results. This enlarging incidence is associated with the development of high speed automotive travel and with the increasing participation of youth in various forms of athletics.

The importance of this type of injury lies, to a large extent, in the commonly underestimated handicaps produced by the unsightly cosmetic deformities which result. Economic and social competition today is so keen that even minor abnormalities in personal appearance may mean the difference between success and failure in business and social enterprise (16). Other important sequelæ of nasal deformities, namely, the various forms of upper respiratory disorders resulting from obstructed air passages, must not be overlooked. It is therefore imperative that these fractures receive greater attention and that their general management be subjected to critical scrutiny in an effort to diminish late hazards.

The past few years have seen little change in the management of simple nasal fractures. The emphasis in current literature is largely upon the more severe types of fracture and the correction of resulting deformities. We shall attempt to review briefly some of the fundamentals of modern treatment.

CARE OF SIMPLE FRACTURES

Diagnosis. Even simple fractures are often mishandled. The injury is frequently thought to be one confined to the soft tissues. A visible deformity indicates the true state of affairs only after the swelling has subsided and the scar tissue has contracted. This is particularly true in children in whom the supportive structures of the nose are resilient and diminutive. These factors hide and disguise the actual situation. Inspection, palpation, or even x-ray examination often fails to disclose the bony lesion. It cannot be overemphasized that every bruising injury to the middle third of the face, especially with pain in

the nasal area, black eyes, epistaxis, or impaired respiration, should be considered to include a fracture of the nose until proved otherwise.

Mobilization and repositioning of fragments. Repositioning of the fragments is usually a simple matter of applied mechanics. Deviations of the entire nasal bridge or lateral spreading of the nasal bones can usually be corrected by external pressure with the thumbs, or by manipulation with a duck-billed Asch forceps. Depressions of either or both of the nasal bones may be elevated with almost any blunt instrument which can be inserted into the nostril. The only definite ruling which should be made in this regard is that all such deformities must be slightly overcorrected to allow for a certain degree of recurrence.

It must be remembered also that satisfactory reduction cannot be obtained without anesthesia. Novocaine injected along each nasolabial fold, plus intranasal packs of cocaine and adrenalin, will usually suffice.

Stabilization of fragments. When the fragments have been replaced, it will often be found that they are sufficiently impacted to remain in proper position. In such cases, splinting devices are not needed and, indeed, may even be harmful. In many cases, however, accurate position and approximation are difficult to maintain.

In depressed fractures, a small gauze pack forced upward between the septum and lateral wall on either or both sides insures against recurrence. In lateral deviations and outward displacements, some type of external splint is needed for stabilization. Bandage rolls held against either side of the nose by adhesive tape (12), or a splint molded from dental compound or soft metal (11) such as aluminum, copper, or tin, are satisfactory. If greater lateral compression is needed, the Joseph or Safian clamps may be applied (6, 9, 10). For this purpose, New advocates passing a mattress suture through the nose and securing it with lead buttons (7). For difficult lateral deviations, Aufrecht and others have devised head bands which exert lateral pressure on the nose, and Risdon has described a dental attachment which fulfills the same purpose (8).

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thorough cleansing and the removal of foreign material are of paramount importance. Débridement, however, should be most conservative in respect to viable bone, cartilage, or skin. Small bony fragments should almost never be removed. These apparently useless bits seldom sequester and often speed the recalcification process across the bony gaps.

Not uncommonly, the force of the impact will completely separate the supportive structures of the nose from their attachment at the glabella. Our practice in such cases is to drill small holes through the remnant of the nasal bone and through the nasal process of the frontal bone so that the nasal bones may be held in position by means of a 22-gauge silver wire passed through these openings (Figure 3). Separated nasal cartilages may also be attached to the nasal bones by silver wires, as described previously.

In the absence of skin losses, the lacerations should be sutured meticulously. Most plastic surgeons prefer subcuticular suturing. This method maintains approximation of the skin edges for a considerable period of time without leaving suture marks (Figure 4). We have described this method of suturing in a previous article (17). Coarse interrupted sutures or skin clips for this purpose cannot be too strongly condemned.

When there is actual skin loss the denuded areas should be covered at once with some form of split or full-thickness graft. For this purpose, we prefer a Wolfe graft from the eyelid or post-auricular area (18). Skin from these regions closely matches the facial integument in color and texture. The graft should be firmly secured with numerous horse-hair sutures, the ends of which are left long and tied over a hard gauze roll to provide pressure (Figure 5).

Support of fragments in comminuted fractures
With severe comminution, it is sometimes impossible to maintain satisfactory alignment of the numerous fragments, especially if the midline support of the septum has been lost. This is often the case when the entire maxilla is displaced posteriorly. Replacement of the fragments is carried out by the same methods described before. Nasal drainage in such fractures should be encouraged. Complete packing is, therefore, contra-indicated except when it is necessary to control severe hemorrhage. Reposition of the fragments is maintained with great difficulty and numerous methods have been described. Watson-Williams uses a triangular silver wire splint which he inserts into each nostril to support the bridge (3). Carter places a straight wire splint into the nostril (19). This splint is supported by traction

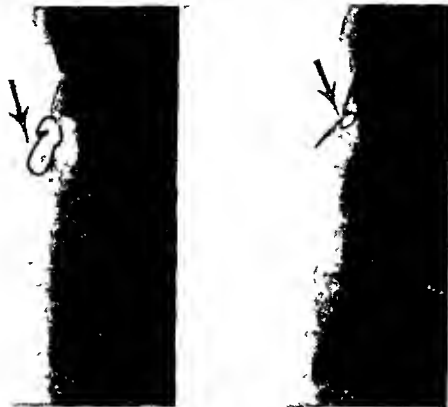


Fig 3 Two roentgenograms illustrating the use of silver wire for attachment of nasal bones to nasal process of frontal bone (a), left, is the same patient shown in Fig 2

from a suture passed through the dorsum of the nose to an external supporting arch. Watkins has modified the Carter splint by using a hairpin-shaped splint, with one arm in the nostril, to avoid the use of the suture through the nose (19). Risdon has described a wire splint which is placed in the nostrils and attached to the dental appliance referred to previously (8).

We use a special head-band appliance which may be used for suspension of fractures of the various facial bones (13, 14, 15). Two rubber covered wire splints are inserted into the nostrils. By a simple mechanical device, these splints may be elevated, tilted to various angles, or shifted laterally, as the situation may require. The bridge may thus be maintained in proper position for several weeks. Two lateral pressure pads may be applied and adjusted separately to prevent spreading of the nasal fragments (Figures 1, 2, 6).



Fig 4 (a), left "Guest passenger injury." Laceration dividing nasal tip and extending about one inch along the bridge of the nose. Alar flaps held back exposing septal cartilage (b) Same patient after healing. This demonstrates the value of meticulous subcuticular suturing



Fig 1 (a) left Typical compound comminuted nasal fracture resulting from "guest passenger injury" to occupant of right hand front seat of automobile. Depressed fractures of both maxilars and complete transverse fracture of the maxilla were associated. (b) Straith appliance used to maintain elevation and lateral compression of nasal fragments. Traction wires through the cheek support an arch bar on the maxilla.

Our head band appliance which is universally applicable to all types of nasal and facial fractures will be described later in this article.

It is difficult to maintain septal fractures in proper position as the cartilaginous septum unites only by fibrous union. Deformities often result.

CARE OF COMPLICATED FRACTURES

Etiology The more severe type of fractures are becoming more common as a result of automobile

injuries. A large percentage of the patients are "guest passengers" who occupy the right hand front seat of the automobile and who have been thrown forward against high instrument panels by the force of the collision. Injuries involving other structures of the middle third of the face are usually associated and intracranial damage is frequent. The nasal fractures are of the comminuted or externally compounded varieties. Commonly, both types are present. Such fractures are difficult to treat since the supporting structures are often so badly damaged that it is almost impossible to attain a satisfactory result. Maceration of the soft tissues of the nose, depressed fractures of the malar and frontal bones, transverse fractures of the maxilla, ruptures of the orbital contents, and skull fractures are not uncommon. Jagged blunt lacerations extending through the shattered nasal bones into the nasal cavity are commonly present (Figures 1 and 2). To return these patients to an appearance simulating their former selves and to a state of contented self confidence is an almost insurmountable task. The early and painstaking care of such injuries is, therefore, of extreme importance since delay or cursory attention spells almost certain defeat.

Management of externally compounded fractures Although compounding adds the distinct hazard of hideous scar deformity, it nevertheless has the advantage of permitting adequate inspection and repositioning of the underlying bony structure under visual control. In these cases



Fig 2 (a) left Another "guest passenger injury" with compound comminution of the nose similar to Fig 1. Edentulous maxilla fractured and impacted upward and backward. (b) center Nasal bones wired together as described in text. Nose supported by Straith appliance. Malar bones elevated. Note traction wires through cheek to molar region of upper denture. Upper jaw pulled down and forward by elastic traction on silver wire passed through drill hole in palate and upper plate. (c) Same patient three months later showing almost complete absence of visible deformity.

temperature is an excellent preservative. The percentage of "takes" with grafts of this type corresponds favorably with that of fresh autogenous material (Figure 7).

Saddle deformities in persons with a high "profile angle," i.e., a profile angle greater than the normal angle of 30 degrees, may be corrected by removal of the "hump" above the saddle and by lowering of the elevated nasal tip below. This is performed through intranasal incisions by Joseph's technique (6, 10) or one of its modifications.

When the nasal tip alone is depressed, the apparent deformity is generally a downward elongation of the nose and a flattening of the tip. These abnormalities may often be corrected through an incision which completely transfixes the columella, separating it from the cartilaginous septum. The septum is then shortened to the desired length and tilt. The soft tissues of the tip are finally raised to the normal elevation by resuturing them to the septum in the heightened position.

In all such restorations, we are guided in securing the proper angles by the use of a profilometer. This instrument indicates accurately the amount of reduction necessary to remove a hump, or the degree of elevation required to raise a depressed nasal tip.

Defects producing excessive dimensions of the nose. These deformities include exostoses, humps produced by callus formation, and widening of the nose from spreading of the nasal bones.

Exostoses usually appear as asymmetrical bulges in the nasal contour. Their removal is accomplished through intranasal incisions with the use of rasps, saws, or chisels.

Direct blows on the nose frequently result in comminution or greenstick fractures at the summit of the bridge. Excessive callus formation at this point occasionally results in a "hump." This is especially true in childhood fractures in which the hump may not become noticeable until complete ossification of the nasal bones takes place at adolescence (Figure 8). These hillocks in the nasal contour may be removed with a saw and rasp through incisions within the nostrils, so placed that instruments may be inserted subcutaneously between the upper lateral and alar cartilages on either side. This removal of the hump leaves a flat plateau unless the septum is left higher than the side walls. The appearance of the nasal bridge is usually further improved by narrowing of the bony bridge. This is accomplished by separation of the nasal bones from the maxilla on either side, followed by mesial compression. For this purpose, either saws or chisels may be employed. We prefer the latter and have

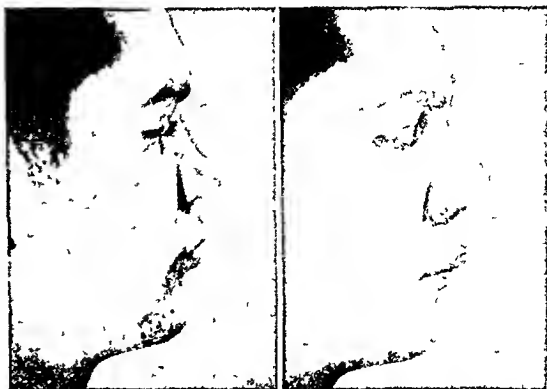


Fig 7 (a), left Saddle nose resulting from nasal fracture. There is a broad flat bridge and a wide overhanging nasal tip. (b) After correction with two pieces of preserved rib cartilage. One piece raises and narrows the bridge, the other supports and narrows the nasal tip.

found that omission of the usual preliminary periosteal elevation avoids much of the subsequent ecchymosis and edema which otherwise results.

Widening of the nasal arch is corrected by lateral osteotomy, as just described, plus separation of the nasal bones from the septum. This latter step is best performed with a broad-bellied saw which not only effects the separation but also removes a narrow strip of bone from either side of the septum. The two nasal bones, thus freed of their attachments, are then compressed by thumb pressure and held firmly in place with a properly fitted splint.



Fig 8 (a), left When twelve years old, this girl suffered a nasal fracture during athletic games at school. Within the following year or two this large hump developed. (b) After correction by modification of Joseph's technique with the use of a profilometer to secure proper profile and tip angles.



Fig 5 (a) left A guest passenger whose nasal skin upper lateral cartilages and septum were gouged by wind shield glass (b) A Wolfe graft from behind the ear was applied immediately and sutured in place with dermal stitches the ends of which were left long and tied over a firm piece of gauze to provide sufficient pressure

REPAIR OF OLD DEFORMITIES

With infection loss of supporting elements or excessive comminution it is often impossible to prevent the occurrence of residual deformity. Disfigurements may also result from failure to recognize the fracture or from grossly inadequate care at the time of the injury. Misshapen noses not only mar the patients physical appearance but also become seriously detrimental to their business, professional social and matrimonial careers. It is almost impossible to describe the mental torture and psychological maladjustments which these people experience. Such disfigurements demand the attention of a skilled surgeon, thoroughly versed in modern rhinoplastic technique.

The vast majority of corrective surgical procedures described in modern literature and some of those to follow are modifications of the rhinoplastic methods first described and used by the late Joseph of Berlin (6).

Defects due to loss of supportive elements. Deficiencies of the structural elements of the nose whether resulting from actual loss crushing or dissolution following infection may cause several common types of deformities. The most frequent varieties are (a) a saddle of the bony portion (b) a saddle of the cartilaginous portion or (c) a dropped tip. Occasionally all three varieties may occur simultaneously. In such cases a general flattening of the entire nose against the face results.

A saddle deformity in an otherwise normally proportioned nose whether alone or combined

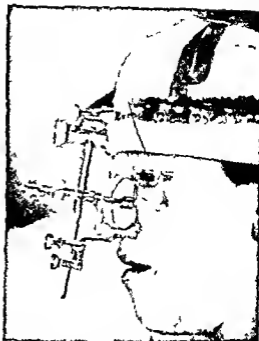


Fig 6 A close up view of the nasal attachments to the Straith appliance. Note the two adjustable wire spools entering the nostrils and the lateral pressure pad

with a dropped tip requires the subcutaneous insertion of some substance which is carved or molded to fill the defect. Many materials have been employed for this purpose but the majority of plastic surgeons today advocate the use of cartilage grafts. These grafts have the advantage of being a compatible physiological material which is readily accepted and indefinitely retained. Other media which have been advocated by a few are ivory gutta percha celluloid bone or a combination of bone and cartilage. We prefer the use of hyaline cartilage from the anterior segments of the sixth to ninth ribs. These grafts may be conveniently measured and shaped with the assistance of a lead mouldage of the patient's face. Such a model is not distorted by blebs of novocaine and is easily sterilized.

With normal tip support, a single straight piece of cartilage carved to fit the defect in the bridge will suffice. Most cases require the addition of a post acting as a strut from the region of the anterior nasal spine of the maxilla to support the lower end of the newly constructed bridge.

For several years we have been using preserved isografts of cartilage, i.e. cartilage from another person. Aqueous merthiolate at refrigeration

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HEAD

Hill, F. T.: Osteomyelitis of the Skull: Comparison of 2 Cases Observed Seventeen and Fourteen Years Ago with 2 Observed in the Past Two Years. *Arch Otolaryngol*, 1937, 26 9

This paper is an attempt to show the effect of certain outstanding contributions to the literature on the management of osteomyelitis of the skull. Two cases treated seventeen and fourteen years ago were eventually treated radically, but not without procrastination, hesitation, and doubt as to the proper management. Edema then was not as important a symptom as it is today, and operation was not done until the x-rays gave strongly positive evidence of involvement of the bone. The reports of McKenzie in 1927, Furstenberg in 1931, and Mosher and Judd in 1933 all definitely show the rationality of radical treatment early in the disease. They illustrate the importance of edema as a diagnostic sign and as a guide to the extent of bone to be removed, they show that x-ray findings are from seven to ten days late, and finally, they ban "watchful waiting" as a particularly dangerous procedure.

In accordance with this more recent knowledge and later opinion, recent cases of cranial osteomyelitis were treated radically early, and although 1 of them terminated fatally because of a streptococcus infection, it was evident that the osteomyelitic process was controlled. Differentiation of the type of osteomyelitis is not the important consideration. It is not a matter of whether the disease is discrete or diffuse, as Munro in 1930 showed that the two processes are essentially the same, rather, it is a matter of recognizing early the possibility of diffusion of the infection and of not hesitating until a local process has actually become a diffuse one.

JOHN MARTIN, M D

Bercher, J., Guillermin, M, and Friez, V P: Does Temporomaxillary Meniscitis Occur? Remarks Concerning a Meniscectomy (La méniscite temporo-maxillaire existe-t-elle? Remarques à propos d'une méniscectomie) *Mém l'Acad de chir*, Par, 1937, 63 455

The authors present the case history of a soldier aged twenty-one years, who was sent to the hospital because of pain during mastication. The pain was

over the region of the temporomaxillary articulations, being most marked on the left side. Movement of the jaw elicited crepitation over the joint which could be both heard and felt, this, too, was worse on the left side.

The complaint had lasted over a number of years but had been much worse during the six months previous to the patient's admission to the hospital. The patient used extreme care in opening the mouth wide enough to admit a finger between the incisor teeth. Wider opening produced intense pain, which persisted for some time after closing the mouth. The mandible was deflected slightly to the left during the opening of the mouth. Pressure over the joints elicited considerable pain. Examination of the teeth revealed pathology in the molars due to the poor alignment of the biting surfaces.

The patient gave no history of rheumatism in any of the other joints and the family history was negative. At the age of ten he had suffered a luxation of the jaw which he reduced himself. There had not been any further difficulty of this nature.

Roentgenograms gave the impression that the distance between the condyle and the base of the glenoid fossa was greater than normal on the left side. Under local anesthesia the left temporomaxillary joint was opened and the meniscus was removed in its entirety. Following the operation, the jaw was found to deviate to the left so that elastic traction on the teeth was needed to correct the deformity as well as to prevent the pain on the right side.

Histological examination of the fibrocartilage showed numerous blood vessels but no inflammatory cellular reaction. The operative results appear to be very satisfactory.

MARSH W POOLE, M D

EYE

Wetzel, J. O: Melanoblastoma of the Lacrymal Caruncle. *Am J Ophth*, 1937, 20 675

A case of melanoblastoma of the lacrymal caruncle is reported in a seventy-six-year-old man. A brown stain at the inner angle of the eye had been noticed nearly eight years before, a few months after a burn to the eye. It remained stationary for nearly five years, then began to grow as a tumor. On examination the tumor was found to be brownish-black.



Fig 9 (a) left Lateral deviation of nose due to nasal fracture (b) Correction by lateral osteotomy and wiring nasal bones to bicuspid teeth on right side

Lateral deviations The management of the deviated septum, so thoroughly discussed on many occasions, need not be dwelt upon here. Suffice it to say that a carefully performed submucous resection is an important step in the revamping of an old nasal fracture. The large numbers of minor septal deviations discovered in routine rhinological examinations are mute evidence of the frequency of unrecognized green-stick fractures sustained in childhood when the nasal framework is resilient and flexible. One point of caution in the technique of submucous resection must be noted. Sufficient support for the dorsum and tip of the cartilaginous septum must be left during resection to prevent the acquisition of a saddle deformity or a dropped tip as the result of such surgery.

Lateral deviations of the bony structure of the nose cause visible disfigurement. The correction of these deformities is accomplished by lateral and dorsal osteotomies as described previously. In long standing deviations one side of the nose is usually broad and flat. To correct this inequality in the width of the nasal bones, it is generally necessary to excise a narrow triangle of bone from the broad side at the junction of the nasal bone with the maxilla. Total deviations of the septum without buckling will often be improved when the bony deviation is shifted to its normal position by this method.

Maintenance of the midline station of the bridge is often difficult because of the elasticity of the cartilaginous elements and the tension of the soft tissues on the shortened side. To prevent recurrence of the deviation, a slight overcorrection should be maintained by one of the methods described in the discussion of deviations in recent

fractures. In our experience, even better results are obtained with Blair's method of wiring the nasal bones to bicuspid or molar teeth on the opposite side.² This is accomplished by making a small incision over the side of the nose toward which the deviation tends. Two small holes are then drilled through the nasal bones on that side. With long straight needles, two ends of a silver wire are then threaded downward through these openings and through the cartilaginous septum to the buccolabial fold of the opposite side. These wires are then secured to a bronze ligature passed around the bicuspid or molars. The nasal bones are thus held in a position of slight overcorrection (Figure 9).

SUMMARY

1 The importance of careful attention to all injuries involving the middle third of the face is obvious as nasal fractures can readily be overlooked. These fractures may result in the development of unsightly deformities which lead to mental, social and economic calamity. Facial injuries in childhood are particularly deserving of careful scrutiny since nasal fractures are often so disguised as to challenge even the most meticulous diagnostic efforts. The resulting deformities may not become apparent until ossification is completed during adolescence.

2 Once nasal fractures are diagnosed, the most painstaking efforts at repositioning are necessary. Slight overcorrection of the deformity is demanded to insure a satisfactory end result. Some method of immobilization must be employed in many instances to prevent a recurrence of the deformity. A wide variety of procedures have been devised for this purpose.

3 In recent years there has been an increasing frequency of severe nasal fractures resulting from automobile injuries. Occupants of the right hand front seat are the most common victims. These fractures are usually comminuted and externally compounded, and are often associated with skull fracture and major injuries to the jaws and other portions of the face. Such fractures demand immediate attention to the soft tissue damage and require special methods of prolonged immobilization of the bony fragments.

4 The more severe fractures often defy all attempts to prevent deformity. When a deformity results the services of a surgeon skilled in modern rhinoplastic methods is essential.

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preserved cadavers' corneas is of great interest not only from a clinical but also from a general biological point of view. **LESLIE L. MCCOY, M.D.**

Bullo, E: A Case of Epithelioma of the Cornea Cured by Plesioroentgentherapy (Un caso di epithoma della cornea guarito con la plesioroent-genterapia) *Radiol med*, 1937, 24: 602

The patient, a man fifty-seven years old, had an epithelioma which occupied about two-thirds of the cornea and left the superior internal quadrant free. Bullo treated it with plesioroentgentherapy, he gave daily applications of 300 roentgens up to a total dose of 3,000 roentgens. An appreciable reduction in the growth and an improvement of vision was evident after the fourth treatment. The usual reactive conjunctivitis reached its maximum in fifteen days. At the end of a month there was a noteworthy regression of the tumor, and at the end of six months it had disappeared. The cornea was smooth but slightly opaque, and a moderate degree of vision remained. A slight but still active vascularization of the cornea has persisted for several months.

Bullo compares the radiological with the surgical treatment of epibulbar tumors, gives a survey of the results obtained with the former, and discusses the reactions of the ocular tissues to radiation. His conclusions are that, although the results of treatment of corneal tumors with radium and the x-rays are equally good, roentgentherapy with the Chaoul tube offers special advantages because of the low tension employed, the short focal distance, the uniformity of radiation, the efficient protection of healthy tissues, the limitation of the conjunctival reaction, and the ambulatory treatment. One of the great advantages of the method is the possibility of applying large doses to the superficial tumor tissue while sparing the retrocorneal structures. In general, the ocular reactions with plesioroentgentherapy are the same as with other radiological methods. The limit of tolerance of the cornea and the maximal dose cannot be stated definitely as the clinical observations are few and the experimental results discordant. The author, however, advises not to exceed from 120 to 150 per cent of the unit skin dose at a single treatment. Because of its superiority to other methods, especially with the technique of plesioroentgentherapy, radiological treatment should be used more often in superficial ocular tumors.

The article is accompanied by stereographs and a bibliography. **M. E. MORSE, M.D.**

Messinger, H. C., and Clarke, B. E. Retinal Tumors in Tuberos Sclerosis: Review of the Literature and Report of a Case, with Special Attention to Microscopic Structure. *Arch Otolaryngol*, 1937, 18: 1

Tuberos sclerosis is a rare form of cerebral sclerosis observed at autopsy in young persons who have shown mental deficiency and epilepsy in association with adenoma sebaceum during life. Adenoma sebaceum is a nodular reddish rash distributed in

butterfly-shaped areas over the nose and cheeks. Multiple tumors of mixed undifferentiated cells may be present in the heart, kidney, spleen, and other organs, including the eye. Although twenty-four instances of retinal tumor have been reported in tuberous sclerosis, the present report is only the fifth in which a microscopic study was made, and the first in this country.

The patient was an Italian male twenty years of age with a history of frequent severe convulsive attacks. At the age of fourteen a diagnosis of adenoma sebaceum was made. Psychometric tests showed him to be retarded four years. Ophthalmoscopic examination showed the right disc to be obscured by a white shiny mass with a nodular surface, extending forward five diopters and overlying the vessels. A few days after admission to the hospital and following a large number of attacks the patient died.

Post-mortem examination revealed typical lesions of tuberous sclerosis, including multiple tumors of the brain, rhabdomyoma of the heart, lipofibromas of the kidneys, and adenoma sebaceum of the Pringle type. Histological examination of the ocular tumor showed it to be lying over the optic disc, involving all layers of the retina and a portion of the optic nerve. In the central part there was a large irregular mass of ossification and about this concretions containing calcium. The surface of the tumor was smooth. The cells varied greatly in size and shape and the nuclei were round or oval. The type of cells was not definitely determined, but it seemed that they must have developed from early cells of the embryonic retina. The authors conclude that the tumor was essentially glomatous.

WILLIAM A. MANN, M.D.

NOSE AND SINUSES

Menne, F. R., and Frank, W. W.: So-Called Primary Chondroma of the Ethmoid. *Arch Otolaryngol*, 1937, 26: 170

The site of origin, the mixed character, and the extent of chondromas of the nasal cavities have been controversial, and therefore the exact frequency of true chondroma is not known.

A summary of the available material shows that the distribution in the sexes is about equal. The ages of the patients range from eleven to sixty years, the tumor occurring with the greatest frequency in the third decade of life. The onset is gradual, and diagnosis is made by rhinoscopy or biopsy. In the majority of the cases mentioned in this article either one or both nares were blocked, with involvement of the septum and the ethmoid and sphenoid bones.

The authors report a case of chondroma occurring in a man forty years of age who presented himself for treatment because of a hard swelling at the inner canthus of the left eye and dimness of vision. On examination, a large tumor was seen obliterating the posterior nasal cavity and extending downward to the nasopharynx. It was not painful or tender. X-ray examination showed the tumor mass to have

and pedunculated and its distal portion was the size of a grape. The palpebral and ocular conjunctiva was invaded by the tumor and the sclera was infiltrated by pigment. The globe was removed. Histological examination showed polymorphous-celled melanoblastoma of a highly malignant type. A small dermoidal inclusion was present beneath the conjunctiva.

Twenty nine cases of pigmented tumor of the lacrimal caruncle were found in the literature. An abstract of each case is presented.

WILLIAM A. MANN, M.D.

Spratt C. N. Primary Carcinoma of the Lacrymal Sac. *Arch. Ophth.* 1937 18 307.

A case of primary cancer of the lacrimal sac is reported. The patient, first seen in June 1927, was a man aged seventy eight whose only complaint was epiphora. A mass in the right lacrimal sac had been noticed for about two months. The mass was from 1 to 1.5 cm. in diameter, and was smooth, round, firm and freely movable. It was diagnosed as a mucocele and removed under local anesthesia. Microscopic examination revealed the carcinomatous nature of the growth. Eight weeks later a second hard fibrous mass was removed. Nearly three years later radium was used to control a recurrence involving the cornea. In March 1931 exenteration of the orbit was done and a mass of about 3 by 2 cm. in size was found in the postorbital space. Two years after exenteration there was no recurrence in the orbit but there was an extensive metastasis to the submaxillary lymph nodes, which was treated by radon implants. The swelling disappeared following this treatment. The patient died of coronary thrombosis two years after the radium implant. Four years after exenteration and eight years after the first appearance of the growth. There was no recurrence at the time of death.

Parsons has described many types of tumors of the lacrimal gland but did not include a new growth. Angiosarcoma, angioendothelioma, cystoma, endothelioma, lymphoma, lymphoangioma, fibrosarcoma, plasmosarcoma, malignant papilloma, and carcinoma have been reported as primary tumors of the lacrimal sac.

The author reports the cases of 16 other patients 12 of which were males.

Thirteen of the 17 patients were over forty years of age while 5 was a boy of eighteen with a malignant papilloma. The only other case in American literature was reported by Lacey in 1927.

The normal lining of the lacrimal sac is composed of cylindrical cells. Repeated irritation due to chronic inflammation may cause this membrane to become thickened and form several layers of cells which change to the squamous variety. Consequently microscopic examination may show the carcinoma to be the cylindrical transitional or the squamous type of cell.

Because of the insidious onset only 1 case was diagnosed correctly as being malignant before the

operation. In the first stage when pressure of the thickened wall causes epiphora to be the only symptom a correct diagnosis is impossible. In the second stage with swelling, a diagnosis can be made. Pressure on the sac causes no regurgitation and the duct is patent on irrigation and probing. Signs of inflammation are absent. In the presence of a mucocele, the duct is generally obstructed and pressure causes regurgitation of the fluid into the nose or from the puncta with diminution in the size of the mass.

Of all cases which could be traced none had been free from recurrence during a five year period. In the author's case no recurrence was observed locally after a four year period. Radium and high voltage x rays offer hope for cure after extirpation of a malignant tumor.

EDWARD S. PLATT, M.D.

Filatov, V. P. Transplantation of the Cornea from Preserved Cadavers' Eyes. *Lancet* 1937 331 1395.

The author says, analyzing my material and taking into account the quality of the leucomatous substratum in which the transplant from the cadaver is placed. I have gained the impression that the results of transplantation from cadavers' eyes are not inferior to those obtained from living eyes. For a final opinion it is of course still necessary to follow up the more remote results of the operations. On the other hand it may be said that the present results in my series of cases that have been under observation from one and one half to two and one half years would already seem to justify the expectation that the more remote results will be favourable.

Investigations are being made in his laboratory on the retention of vitality by the cornea under various conditions of preservation. Experiments carried on by Bazhenova have shown that the cornea of rabbits' eyes may show a good tissue growth when planted *in vitro* even after ten days' preservation at a temperature of 2° C. In collaboration with Bazhenova the author has obtained a tissue culture from dried cornea. Vetter working in the author's laboratory has shown in rabbits the possibility of transparent union of the cornea taken from eyes preserved at a temperature of 2° C. for as long as fifteen days. The author's pupil Papekno has brought forth evidence for migration of cells and their formation into clusters in the cornea and in other tissues after preservation of the material for eight days at a temperature of 2° C.

The cornea from eyes of human cadavers removed some hours after death and preserved at a temperature of from 2° to 6° C. is suitable for homoplast transplantation in man as the transplant retains permanent transparency after union with the substratum.

The new source of material for transplantation opens up great possibilities for further investigations on corneal grafting.

In connection with the transfusion of preserved cadavers' blood first applied to dogs by Shamov and to man by Rudin the successful transplantation of

lesions and no autopsy was permitted. This method of treatment, the authors note, is both difficult and dangerous, because the degree of reaction of the tissues to tuberculin is uncertain, hence it is justified only in severe lesions.

In the second case there were dysphonia and pain on swallowing, but the larynx appeared normal on laryngoscopic examination. The patient died from a pulmonary hemorrhage and at autopsy showed an ulceration underneath the right vocal cord which extended into the deeper tissues, but not superficially as it would then have been visible on laryngoscopic examination.

In the third case, there was a visible ulceration in the region of the left vocal cord, but the cord itself appeared normal. Aphonia developed only when there was an exacerbation of the pulmonary lesion, which lesion eventually caused the death of the patient. At autopsy a caseous nodule was found in the deeper structures of the cord, underneath a practically normal epithelium involving the lower portion of the thyro-arytenoid muscle.

In the fourth case, there were extensive pulmonary lesions and an ulceration of the glottis which caused aphonia. A thoracoplasty resulted in arrest of the pulmonary process, and later repeated treatments by fulguration with the high-frequency current resulted in healing of the ulceration in the larynx.

In regard to the treatment of tuberculosis of the larynx in general, the authors consider these three methods the most effective: galvanocauterization or ignipuncture, fulguration with the high-frequency current, the cold spark, and the application of lactic acid. The method of fulguration is especially indicated in superficial ulcerations. As such ulcerations heal, lactic acid or zinc chloride are applied to aid the healing process and prevent too extensive fibrosis. If the larynx is fibrotic, lactic acid may be applied with some friction, and such applications are well tolerated. In the vegetative, pseudotumorous, forms of laryngeal tuberculosis, galvanocauterization is the method of choice. However, no form of active treatment of the laryngeal lesions should be carried out while the pulmonary lesion is active, only during a period of relative quiescence is such treatment permissible.

ALICE M. MEYERS

Diggie, F. H.: *The Treatment of Intrinsic Laryngeal Cancer*. *J. Laryngol. & Otol.*, 1937, 52: 463.

During the years from 1931 to 1935, inclusive, 26 patients with limited intrinsic malignant disease of the larynx were treated by the Finzi-Harmer radiation method, radiotherapy following thyroid fenestration. The operative technique has been similar in every detail to that recommended by Harmer in his original publication. The position of the needles,

each containing 1 mgm. of radium element, with a 0.5 platinum screen, and usually an active length of 1.5 cm., is checked with x-rays after insertion. The number of needles used and the duration of radiation depend upon the extent of the lesion. In no case was tracheotomy performed. Fifty per cent of the cases were verified histologically. Of the 6 deaths, 5 (19.2 per cent) were due to the malignancy, with a larynx never free from disease, but the sixth patient survived twenty months, to succumb finally to cancer of the palate, with a larynx free from the growth which had previously been verified.

There was no operative or immediate postoperative death in the group treated by the Finzi-Harmer method, while in the group treated with laryngofissure the operative mortality was 11.1 per cent. In the former group 77.7 per cent of the patients were free from symptoms for three years, and recurrence took place in 22.2 per cent, in the latter group the relative figures were 61.1 and 16.6 per cent. The discrepancy was due to the fact that 2 or 11.1 per cent of the patients in the latter group did not survive the operation, while another 2 died from other causes with a larynx free from disease. From these figures it appears, therefore, that treatment by the Finzi-Harmer method of radiation gives a lower operative mortality with a greater risk of recurrence or persistence of the disease than treatment with laryngofissure. Following the Finzi-Harmer radiation the larynx is usually more congested than after laryngofissure.

From the statistical tables it would appear that similar results can be achieved by either method of treatment, whether the vocal cord be fixed or not, and even with a limited invasion of the anterior commissure. The original method of Finzi-Harmer radiation seems to be unsuitable for subglottic infiltrations. The convalescence following a laryngofissure is quicker, more certain, and less tedious than that following the Finzi-Harmer radiation. The congestion and edema following the Finzi-Harmer radiation mask the laryngeal picture so that the laryngologist is frequently unable to give an authoritative opinion during the subsequent months. Time alone will show whether the results achieved by the Finzi-Harmer radiation operation are as lasting as those following laryngofissure. One has to keep in mind the possibility of radium necrosis which may be long delayed and even end fatally with no recurrence of the malignancy. If the radiation treatment of intrinsic laryngeal cancer is to progress, it must be given opportunities in early lesions, but its future will depend upon the closest cooperation between the radiotherapist and the trained laryngologist, who alone can decide the site and extent of the lesion and its suitability for treatment.

JOSEPH K. NARAT, M.D.

involved both antrums and both ethmoids. Eighteen months later the patient was readmitted to the hospital. He died about one month later approximately four and one half years after the onset of symptoms.

Autopsy disclosed primary chondroma of the naso-pharynx with extension into the cranial and orbital cavities marked bilateral exophthalmos, pressure atrophy of the optic chiasma and moderate internal hydrocephalus. Microscopic examination disclosed the tumor to be composed of cartilage cells encased in groups by fibers of myxomatous connective tissue.

In the summary and conclusion the authors draw attention to the slow progressive development of a chondroma occurring in a forty year old laborer, which apparently originated from the processus sphenoidalis of the nasal septum. The origin of true chondroma from the ethmoid region, as some authors report, is questioned.

JOHN F. DELPE, M.D.

MOUTH

Fulton, J. S. X-Ray Therapy in Malignant Disease of the Throat. *J. Laryngol. & Otol.* 1937 52: 492.

The author states that in the treatment of malignant disease of the throat, as well as in other sites three possible methods must be considered: complete surgical removal, implantation of radium and external radiation.

Radical surgery of the throat is a procedure not without risk and one which as a rule leaves the patient with some permanent physical disability. The implantation of radium is a matter of considerable technical difficulty and except in intrinsic carcinoma of the larynx and in a number of reasonably localized tonsillar lesion, probably yields results only in lesions which are so radiosensitive that the lower lethal dose is obtained despite the imperfect physical distribution of the radium. Furthermore the satisfactory implantation of radium into the primary lesion still leaves the gland problem, and further measures either surgical or radiological are necessary to deal with this. With external radiation on the other hand this problem does not arise and the treatment, as a rule is designed to embrace both the primary lesion and the lymphatic drainage area. Moreover, this form of treatment has an advantage over radical surgery in that cure is associated with a perfect functional result.

JAMES C. BRASWELL, M.D.

Charteris, A. A. The Use of Radium in Certain Malignant Conditions of the Throat and Nose. *J. Laryngol. & Otol.*, 1937 52: 484.

The author states that it is worth while to emphasize that radium as ordinarily used in small quantities has a strictly local effect depending upon the arrangement of the radium in the tissues or on the apparatus. The use of larger quantities at a greater distance will give an enhanced depth effect

although in large blocks of tissue this effect falls far short of the homogeneity which x rays or the radium beam can attain. The constitutional effect of using radium in this way should also be considered since it may at times be a serious one. The use of still larger quantities of radium in specially protected apparatus telerradium therapy or radium beam therapy is much more efficient, and does not produce the same constitutional effect. It has given most encouraging results in the domain of the throat and nose surgeon.

JAMES C. BRASWELL, M.D.

NECK

Riedl, T. Laryngeal Tuberculosis. *J. Laryngol. & Otol.* 1937 52: 537.

Experiences with laryngeal tuberculosis over a period of thirty years are presented with special reference to the cause, course, prognosis, and therapy of the disease.

The author has noticed that laryngeal tuberculosis coincides with activity in a pulmonary focus and develops into a circumscribed localized laryngeal condition. The observations and research indicating that laryngeal tuberculosis may be either lymphogenous or hematogenous in origin are reviewed. It is indicated that the benign types are probably of lymphogenous origin while the malignant types are hematogenous in origin. It was emphasized that when laryngeal tuberculosis increases in severity in spite of ideal local and general treatment there is reason to suspect primary pulmonary tuberculosis.

The author reports a case of advanced laryngeal tuberculosis in which recovery occurred, which shows that a definitely unfavorable prognosis should not be given. The local treatment of the larynx must be supplemented by adequate sanatorium treatment. Neither the Killian suspension method for endo-laryngeal operations nor tracheotomy was recommended. The method of cauterization of tuberculous ulcers of the vocal cords is discussed in some detail.

ROBERT ZOLLINGER, M.D.

Derscheid, G. and Toussaint, P. Some cases of Laryngeal Tuberculosis. (Quelques cas de tuberculose laryngée). *Arch. méd.-chir. de l'appar. respir.* 1937 12: 234.

Among the cases of laryngeal tuberculosis reported by Derscheid and Toussaint, there was one with perforation of the epiglottis which caused great difficulty in swallowing. This patient had extensive incurable pulmonary lesions and was cachectic so that no treatment for the laryngeal lesions would have been attempted except for the relief of the pain had it not been for the perforation of the epiglottis. For the treatment of this lesion 1 c.c. of a 1:100 solution of tuberculin was injected through the laryngoscope around the perforation. There was only a very slight febrile reaction and swallowing was normal for six weeks. A second injection was then necessary and this also gave symptomatic relief. The patient died from the extension of the pulmonary

lesions and no autopsy was permitted. This method of treatment, the authors note, is both difficult and dangerous, because the degree of reaction of the tissues to tuberculin is uncertain; hence it is justified only in severe lesions.

In the second case there were dysphonia and pain on swallowing, but the larynx appeared normal on laryngoscopic examination. The patient died from a pulmonary hemorrhage and at autopsy showed an ulceration underneath the right vocal cord which extended into the deeper tissues, but not superficially as it would then have been visible on laryngoscopic examination.

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Alice M. Meyers

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each containing 1 mgm. of radium element, with a 0.5 platinum screen, and usually an active length of 1.5 cm., is checked with x-rays after insertion. The number of needles used and the duration of radiation depend upon the extent of the lesion. In no case was tracheotomy performed. Fifty per cent of the cases were verified histologically. Of the 6 deaths, 5 (19.2 per cent) were due to the malignancy, with a larynx never free from disease, but the sixth patient survived twenty months, to succumb finally to cancer of the palate, with a larynx free from the growth which had previously been verified.

There was no operative or immediate postoperative death in the group treated by the Finzi-Harmer method, while in the group treated with laryngofissure the operative mortality was 11.1 per cent. In the former group 77.7 per cent of the patients were free from symptoms for three years, and recurrence took place in 22.2 per cent, in the latter group the relative figures were 61.1 and 16.6 per cent. The discrepancy was due to the fact that 2 or 11.1 per cent of the patients in the latter group did not survive the operation, while another 2 died from other causes with a larynx free from disease. From these figures it appears, therefore, that treatment by the Finzi-Harmer method of radiation gives a lower operative mortality with a greater risk of recurrence or persistence of the disease than treatment with laryngofissure. Following the Finzi-Harmer radiation the larynx is usually more congested than after laryngofissure.

From the statistical tables it would appear that similar results can be achieved by either method of treatment, whether the vocal cord be fixed or not, and even with a limited invasion of the anterior commissure. The original method of Finzi-Harmer radiation seems to be unsuitable for subglottic infiltrations. The convalescence following a laryngofissure is quicker, more certain, and less tedious than that following the Finzi-Harmer radiation. The congestion and edema following the Finzi-Harmer radiation mask the laryngeal picture so that the laryngologist is frequently unable to give an authoritative opinion during the subsequent months. Time alone will show whether the results achieved by the Finzi-Harmer radiation operation are as lasting as those following laryngofissure. One has to keep in mind the possibility of radium necrosis which may be long delayed and even end fatally with no recurrence of the malignancy. If the radiation treatment of intrinsic laryngeal cancer is to progress, it must be given opportunities in early lesions, but its future will depend upon the closest cooperation between the radiotherapist and the trained laryngologist, who alone can decide the site and extent of the lesion and its suitability for treatment.

Joseph K. Narat, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS CRANIAL NERVES

Sauerbruch F. The Development and Present Status of the Doctrine of Cerebral Pressure (Entwicklung und Stand der Hirndrucklehre) *Zentralblatt f. Chir.* 1937 p 703

Von Bergmann was the first to advance the idea of compressio cerebri i.e., cerebral pressure. Inasmuch as the brain is incompressible, a decrease in size of its mass by pressure cannot occur for the purpose of avoiding the limitation of space but displacement of the spinal fluid and the blood in the canal of the spinal cord membrane and in the blood circulation may occur. However the free space of the former is limited and the counterpressure in it expresses itself in the vascular spaces of the brain. Consequently there first occurs stasis of the blood then anemia in the capillary region and then general anemia of the brain. The resulting stimulation of the vagus centre causes the pulse to slow up. On the other hand Adamkiewicz has said that the pulse is slowed up because of the direct pressure upon the brain substance. Kocher and Cushing's experiments confirmed Bergmann's view and showed a regulatory reciprocal relationship between the cerebral pressure and the blood pressure until the cerebral pressure became too great. With the aid of the negative pressure chamber Sauerbruch has been able to show in animals that at first with increase of the pressure a venous stasis occurs but then the brain becomes paler and paler and particularly that in spite of a well maintained circulation, cerebral symptoms appear when the brain as a whole is reduced and compressed by air pressure. Hauptmann and Hartmann have confirmed these experiments. In addition the latter sets up a wonderful plan of experimentation: exclusion of the experimental animal from its own general circulation and the restoration of its own cerebral circulation in such a way that a second animal takes over the latter with the aid of the so called Starling heart lung apparatus.

Hartmann found the following: (1) an influence upon the circulation in the skull (2) displacement of the brain and localized change of form, and (3) that the race between the cerebral pressure and the blood pressure is independent of the blood perfusion of the medulla but dependent upon the compression of the brain itself.

Nevertheless, all of the complexities of compression of the brain are not clarified with this explanation. Large tumors may run their course without and small ones with cerebral pressure. Reichert has called attention to the individually different relationships between the size of the brain and the free space of the skull, normally about 10 per cent. In the child this space is smaller, and therefore pressure symptoms appear earlier. Aside from that Sauer-

bruch believes that the brain in itself has a varying biological power of reaction and that every brain has a varying reaction to the various diseases. Undoubtedly the increased production of spinal fluid is an important factor but in no case is it produced by mechanical stasis. It is also certain that at necropsies one not rarely encounters such a marked increase in volume that the brain can later hardly be brought back into the skull cap. The idea of swelling of the brain is not yet clarified at any rate there is no edema of the cerebral substance. There may be colloidnephysicochemical forces in play. It is not the size of a tumor or the amount of the pressure that is decisive in cerebral pressure, but the site.

(FRANZ) LOUIS NEUWELT M.D.

Bohren D. Contributions to the Question of the Fate of Patients with Injury of the Skull (Beiträge zur Frage des ererblichen Schicksals der Schädelerletzten) 1936 Zurich Dissertation.

In a laborious and comprehensive report the author presents an accounting covering the establishment of an accident insurance department by the Swiss Institute with special reference to sufferers from skull injuries. Incidentally, this report is a valuable contribution to the question of the eventual fate of these persons.

The article starts with a rough sketch of the present status of scientific and emergency surgery in brain injuries. The author builds his arguments upon the fundamental arrangements as found in Reichardt's *Manual of Accident Therapy* (Reichardt's *Handbuch der gesamten Unfallheilkunde*) then he mentions Naegeli's hypothesis of encephalics which is as yet an uncertain and wavering theory and finally he considers the important results of Juillard's follow up examinations concerning the habits of patients with injury of the skull. Juillard's results spurred the author on to evaluate the results of his own follow up examinations. The current standards and practice of the Swiss Accident Insurance Institute as published by Pometta are quoted. The patients seen from 1922 to 1926 who received compensation in a lump sum or as a permanent annuity during nine years were examined and reexamined. The number of skull injuries occurring during the years mentioned was about the same varying from 2.6 to 3.05 per cent but a remarkable decrease in the number of the fatal cases during the several years was noted the number of survivors increased from 52 to 61 per cent. Whether the treatment was responsible for this difference cannot be determined at this late date. Of the survivors fully two thirds were completely healed and presented no perceptible invalidity. The majority (88 per cent) of the fatal cases occurred immediately following the injury up to the eighth day. Anyone living at the end of one week after the injury in all probability will continue

to live. Complications are minor causes of fatalities, meningitis was the cause of death in 3 per cent. Ninety of the injured that could be located in Luerne and its vicinity were subjected to follow-up examinations according to the method of Juillard. These were visited personally by the author in their own environments during the years from 1933 to 1936 in order that they could be approached in a more human or social manner, and a clear judgment obtained of their complaints and of their appearances. The majority were in the older age groups. According to the diagnoses, during 1922 to 1926 when roentgen pictures were not taken often, fractures of the vault were noted in 39 patients, of the base of the skull in 49, and of both, in 2. Sixty-seven of the cases were annuity and 23 were settled cases. In the 67 annuity cases 14 (20 per cent) of the patients were entirely free from all complaints, 24 (36 per cent) stated they were greatly benefited, 22 (33 per cent) stated that their condition remained unaltered, and 7 (11 per cent) complained of being in a worse condition. In 4 of the last group of 7, distinct pathological entities independent of the accidents were found. The basal fractures apparently showed the better end-results. As a whole, the ratio of the patients who were benefited to those not benefited or those who were presenting progressively serious conditions was 38 to 29. Of 9 injured persons afflicted with epileptic seizures 5 were entirely free from attacks, 1 had less frequent attacks, and only 3 experienced no difference in their condition. The prognosis of traumatic epilepsy, accordingly, is not so unfavorable. Of the 23 paid-off patients 12 were completely free from symptoms and 11 were substantially benefited. These results prove the accuracy of judgment on the part of the Swiss Accident Insurance Institute. Fifty-five per cent of all insured patients, receiving annuities or given cash settlements, were totally or partially employed in their normal vocations, 24 per cent in new occupations, and 21 per cent were unemployed either because of total disability or the scarcity of jobs. The number rendered totally disabled by accidents corresponded exactly with the figures of Juillard, viz., 10 per cent. In only 2 of the 67 annuity cases was the compensation too little, in 8 cases based upon re-examination it was too great, in the remaining 57 it was very fair. The paid-off employees altogether could be returned to their normal employment in a very short time. The fact that the injured improved as a result of the training emphasized by Juillard could be wholly and completely corroborated. In conclusion, the results of the 90 follow-up examinations of the skull in the fracture cases was given in detail.

(WANKÉ) MATTHIAS J. SLIFERT, M.D.

Sjöqvist, O., and Kessel, F. K.: Subdural Hematoma (Ueber das subdurale Hämatom). *Ör. Tag d. deutsch. Ges. f. Chir.*, Berlin, 1937.

The authors reported their experiences with 23 subdural hematomas observed at the Stockholm Neurosurgical Clinic under Olivecrona and the Mu-

nich Surgical Clinic under Magnus. Recent investigations, also studies of their own material, have demonstrated that there are hardly any differences either clinical or histological between so-called pachymeningitis hemorrhagica interna and chronic subdural hematoma. Trotter had expressed this view in 1914. Cushing and Putnam in 1925 could find only slight histological differences. Griswold and Jelsma then definitely expressed the opinion that chronic subdural hematoma and pachymeningitis hemorrhagica interna are the same condition both clinically and pathologically. Trauma is of considerable importance in the development of subdural hematoma; however, it may be comparatively harmless. Fractures occurred only four times, in the authors' material. The hemorrhage into the subdural space occurs only once and is apparently final. The further enlargement of the hematoma results from osmosis, as the brilliant experiments of Gardner, the American investigator, have demonstrated. Of the 23 patients reported by the authors 21 were males, equally divided in all age groups from the first to the sixth decade. A definite history of trauma could be established in 14 cases, approximately two-thirds of all the cases. Chronic alcoholism and hypertension were observed in 2 cases. The so-called free interval varied from several hours up to nine months, with an average of forty-two days. The symptoms of subdural hematoma are first, cerebral manifestations such as headache, vomiting, stupor, and delirium. These general symptoms may progress till a state of coma is reached. In late cases one observes papilledema and slowing of the pulse. In the 23 cases of the authors, stupor occurred in 19, headache in 17, vomiting in 11, and edema of the optic disc in 12. In 3 cases there was some doubt whether edema had occurred. Mental disturbances, especially stupor, are the most frequent symptoms of subdural hematoma. The following changes may occur as local reactions comparatively mild pareses, which may be homolateral, convulsions, ophthalmoplegia, nystagmus, and disturbances in sensation. The spinal fluid at times shows xanthochromia. The diagnosis is established by eliciting a history of trauma to the skull, followed by a free interval frequently of considerable extent and then the occurrence of severe headaches, psychic disturbances, and, eventually, edema of the optic disc, as the main symptom. In late cases the clinical differentiation of subdural hematoma from brain tumor and brain abscess is frequently impossible. The therapy of subdural hematoma consists in surgical removal. A trepanation is usually not demanded. According to the suggestions of MacKenzie, Flemming and Jones, Naffziger, and others, simple drainage through a drill opening may be sufficient. If this procedure is inadequate to empty the hematoma completely, osteoplastic surgery may be tried. The postoperative course is frequently stormy and complicated. The prognosis is favorable. Of the authors' 23 patients only 1 died, two days after operation, from hyperthermia. The follow-up examination of patients more

than two years after operation showed that all were well and working. The original article is accompanied by illustrations JACOB E. ALLIV, MD

Frazier C H, Alpers R J, Pendergrass E P and Chamberlin G W. The Effects of Irradiation on Gliomas. *Am J Roentgenol* 1937 38 203

Thirty cases of glioma in which histological specimens were available before and after irradiation were selected for this study. The types of glioma were distributed as follows: medulloblastoma 12, glioblastoma multiforme 7, astrocytoma 6, ependymoma 2, oligodendroglioma 3. The cases were subdivided into a group which received inadequate treatment less than 1,000 roentgens, a group which received moderate treatment from 1,000 to 2,000 roentgens, and a group which received adequate treatment more than 2,000 roentgens. The average daily dose delivered was approximately between 120 and 125 roentgens measured in air. Treatment was started with a single administration of 50 roentgens and the dose was increased by 25 roentgens per day. The daily treatment was increased to 200 roentgens as this amount could be tolerated.

Of the 12 medulloblastomas, 5 showed either a moderate or marked response to irradiation, 5 a mild response, and 2 no response at all. The changes were visible largely in the cells. Next to the tumor cells, the connective tissue showed most change. In 8 of the 12 cases the stroma was definitely increased in the tumor after irradiation. Relatively few changes were found in the vessels themselves. While these tumors are radiosensitive, in no instance did the authors find them completely or nearly completely destroyed by irradiation. The amount of tumor tissue affected by irradiation was estimated at one fourth or one fifth. From their data the authors are convinced that these cases have been under irradiated, particularly from the standpoint of the quantity of radiation delivered during each series of treatment and the interval between the respective series.

Destruction of the most radioresistant cells and inhibition of cell regeneration can be attained only by using the maximum number of skin portals, by treating each portal to the limit of skin tolerance, and by maintaining the shortest possible interval between the series of treatments.

Seven tumors of the glioblastoma multiforme type were studied, and it was concluded that from the radiation standpoint 4 cases were adequately treated, 2 were treated moderately well, and 1 was inadequately treated. Only 4 of the tumors revealed a histological response, and this was only of a mild degree. Three revealed no evidence whatever of response to irradiation. In these tumors it is essential to deliver a 'skin tolerance' dose of radiation through as many as 4 or 5 portals. The time interval between the series of treatments may be longer than that advisable for the medulloblastomas.

Of the 6 astrocytomas studied, 3 showed a good response to irradiation. The response of 2 was quite striking; they developed into more mature forms. The authors concluded that some astrocytomas are radiosensitive, at least in some degree. This is true particularly of the tumors in this group which are not fully matured. Irradiation appears to be indicated for these tumors. It is concluded that these tumors should have a much larger dose at each series of treatment than has been given previously. Probably doses of from 2,000 to 2,400 roentgens can be given safely through each of several portals in most cases.

Two cases of ependymoma showed marked changes after irradiation. The changes involved the cells and stroma. Both cases assumed a more benign character under the influence of irradiation. Each case received a tumor dose greater than 4,000 roentgens.

In none of the 3 oligodendrogliomas studied was there any postirradiation finding which could be attributed to radiation. For all practical purposes these tumors may be regarded as radioresistant.

HAROLD OCHSNER, MD

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Dawson, E. K., and Shaw, J. J. M.: Mammary Cancer with Generalized Telangiectatic Carcinoma (Carcinoma Erysipelatodes). *Brit J. Surg*, 1937, 25 100

Mammary cancer with generalized telangiectatic carcinoma has been variously described as carcinoma erysipelatodes, erysipelas carcinomatosis, carcinoma telangiectaticum, malignant lymphangitis, inflammatory cancer, and miliary carcinosis. The condition is apparently always primary in the breast, but the characteristic picture of reddened, erysipelas-like skin, the frequent error in diagnosis, the extensive and progressive cutaneous involvement, and the rapidly fatal termination have raised the question whether the condition should be regarded as a clinical and histological entity rather than a late or special manifestation of mammary carcinoma.

These authors have made routine examinations of more than 400 cases of mammary carcinoma in the Edinburgh Royal Infirmary, and found 8 cases which belong to this type. The age of the patients ranged from thirty-eight to seventy-three years. Three patients developed bilateral breast tumors. No case was associated with pregnancy or lactation. Death occurred in 4 cases within seven months of the first symptom, 2 cases are very recent. Of all these cases 1 appeared especially worthy of record because it provided an opportunity for the observation of the progressive clinical picture and for the examination of biopsy and autopsy tissues in detail.

The patient, a married woman aged forty-seven years, had attacks of "neuralgic pains in the left side of the neck after sitting in a draft." She had applied mustard to the area, which became red but did not blister. The color slowly grew less vivid but persisted. Three months later small deep purplish raised areas appeared near the center of the reddened zone, and after a few more months the whole original site of the mustard application became raised above the level of the surrounding skin and showed lateral extension. Eight months later similar red patches appeared on both breasts with swelling and pain in the breasts. After another month the right arm became swollen, and lumps appeared in the axilla and above the clavicle. At this stage she consulted a doctor for the first time. Biopsy material was obtained from the lesion on the neck and from the axilla. She was then treated by irradiation, which was locally effective. She died suddenly one year and eight months after the first indication of trouble.

The autopsy showed a tumor growth in both breasts, the right pectoral muscles, the right lung and pleura, pericardium and epicardium, larynx and esophagus, gastric serosa, liver, gall bladder, pancreas, both suprarenal glands, urinary bladder, vagina, piarachnoid, and lymph nodes in numerous

areas. There was also extensive involvement of much of the skin of the thorax, face, and upper limbs.

The histological examination of the biopsy tissue from the skin of the neck showed hemangioma-like areas with greatly dilated vessels below a thin and bulging epidermis. These vessels contained masses of tumor cells and were considered, from their anatomical distribution and contents, to be branches of the terminal blood capillary loops of the skin papillae. The type of cell was squamoid rather than squamous, and did not necessarily indicate an epidermal primary growth. No thrombosis was seen in these invaded capillaries. The endothelial cell lining was intact in the less dilated vessels, but had disappeared in the more distended vessels. Examination of the biopsy tissue from the axillary lymph node showed that the lymphoid tissue was almost completely replaced by a malignant growth of a similar squamoid cell type accompanied by dense fibrous tissue.

The histological examination of the skin at autopsy showed a varied microscopic picture. Some areas showed multiple small nodules of dilated tumor-filled capillaries surrounded by granulation tissue similar to those in the biopsy picture; others showed nodules with little pericapillary stroma proliferation, or hemorrhages and fibrosing perivascular connective tissue which had caused partial or complete destruction and disappearance of both tumor and blood cells from the lumen. Thrombosis was rare and present only in the larger vessels. Skin from the neck showed invasion of the lymph vessels and veins in the muscle substance as well as involvement of the skin itself. The right breast showed the tumor growth as a malignant intraductal cell proliferation in numerous small ducts surrounded by much elastic tissue, as well as extensive invasion of the corpus mammae. Lymph vessels, capillaries, and small arteries were also invaded. The left breast showed no primary tumor but extensive malignant spread which was considered metastatic. The right pectoral muscles, the right visceral pleura, and the right lung itself showed tumor nodules as well as invasion of the lymph and blood vessels. The larynx, trachea, and esophagus showed no actual nodules but extensive invasion of the lymph and blood vessels. The epicardium showed a localized area of malignant invasion. In the liver and the suprarenal glands there were emboli of tumor cells in the vessels. The pancreas presented small nodules of malignant cell infiltration and also massive invasion of the blood and lymph vessels. In the vaginal wall there was a nodule of tumor cells. All of the lymph nodes examined showed loss of normal architecture caused by extensive replacement of the lymphoid tissue by malignant growth.

J DANIEL WILLEMS, M D

TRACHEA LUNGS AND PLEURA

Robin I G, and Mann W N. Carcinoma of the Trachea. *Guy's Hosp Rep Lond* 1937 87 318

This is a report of a case of carcinoma of the trachea in a man fifty eight years old who had symptoms of severe respiratory distress over a period of twenty four hours following a severe fit of coughing. For about ten days he had suffered from dyspnea aphonia and aphagia. For two months he had a persistent cough which produced a clear mucoid sputum. On examination there was embarrassment of the respiration with inspiratory stridor and pale cyanosis. The mouth and pharynx were normal but the glottis was widely open, and there could be seen a large black sloughing mass in the subglottic region extending over the anterior and the left walls of the trachea and reaching up to the level of the true vocal cords. There were no enlarged lymph nodes in the neck and the thyroid gland appeared to be normal. The immediate diagnosis was subglottic obstruction of uncertain cause. The immediate treatment consisted of placing the patient in a steam tent. Great improvement and relief followed but four days later the patient suddenly collapsed with signs of cardiac failure and died.

On post mortem examination the esophagus and the larynx including the vocal cords appeared healthy. The first 5 mm of the trachea were normal but immediately below this level there was found a large ulcer roughly circular in shape and about 2.5 cm. in diameter. It was situated on the anterior wall and extended into both lateral walls of the trachea. It did not obstruct the air passage. The ulcer was shallow with a hard irregular and friable floor. The tracheal cartilages were partly destroyed in front and the left lobe of the thyroid gland was infiltrated by direct extension of the growth. The pretracheal fascia was complete and not infiltrated. There was no involvement of the cervical lymph nodes.

Microscopic section showed a well differentiated squamous cell carcinoma containing a few typical cells. Immediately below the vocal cords the columnar type of epithelium was found but this rapidly gave way to the transitional type of epithelium and then to the squamous type.

J DANIEL WILLEMS M.D.

Myers B. Gaucher's Disease of the Lungs. *Brit M J* 1937 2 8

The patient was a girl aged two years and seven months who was admitted to the Royal Waterloo Hospital on September 16 1931. The liver was enlarged and the spleen much enlarged. The red blood corpuscles numbered 800 000 per c mm and the white 3 100. The hemoglobin was 19 per cent. A diagnosis of Gaucher's disease was made and splenectomy was performed three days after admission. A perfect recovery followed and in four months the blood count was normal.

During April 1932 the patient was readmitted with a diagnosis of osteomyelitis of the lower end

of the right femur and operation was performed. The author believes it was an invasion by Gaucher cells and not osteomyelitis.

During the next two years gradual atrophy of the bodies of about 7 dorsal vertebrae developed which was obviously due to the Gaucher process.

The next year the lower end of the left femur had an acute flare up which was diagnosed as Gaucher's disease. No operation was done. The condition healed.

In August 1935 the child was readmitted with a chest condition which proved to be Gaucher's disease although repeated examinations of the sputum failed to disclose Gaucher cells in the remainder of the time that the child lived.

The liver became greatly enlarged and during 1936 various nervous manifestations developed. Death took place on January 15 1937 and a partial necropsy verified the diagnosis of Gaucher's disease.

The pathological report and a commentary on the findings are given.

The affection of the lungs by this disease must be extremely rare for the only other definite case so far noted is quoted in the French literature.

The most recent views on the pathological chemistry of Gaucher's disease are stated.

Photomicrographs are reproduced in a special plate.

CARL R. STETLER M.D.

Bérard L. Dargent M. and Francillon J. Clélectomie. Supplementary Operation to Thoracoplasty in the Surgery of Pulmonary Tuberculosis (La clélectomie opération complémentaire de la thoracoplastie dans la chirurgie de la tuberculose pulmonaire). *Arch méd-chir de l'appar respir* 1937 12 222

When the first thoracoplasty was done in France in 1913 by Bérard and Dumarest collapse of the apex of the lung was obtained by partial resection of the upper three ribs through an anterior incision and by resection of the inner third of the clavicle. Thirteen years later the patient was apparently well had no functional disability and was working as a diver. From 1913 until recently little attention had been paid to resection of the clavicle in association with thoracoplasty as it was considered a needless procedure. In 1935 Fiolle and Carcassonne again brought up the subject for discussion and pointed out its advantages. Acquaviva has declared his enthusiasm for it and Cahen has pointed out the value of isolated resection of the clavicle in the treatment of certain old fractures with pseudarthrosis.

After a careful study of the problem from anatomical and surgical standpoints the authors conclude that resection of the inner third of the clavicle facilitates the approach to the upper ribs through the posterior route and allows for greater lateral collapse of the lung as the scapula can fall in closer to the vertebral column. When the muscular attachments of the scapula are left intact no functional disability follows but the operation as an independent

ent procedure has no value in collapse therapy. However, when it is combined with posterior thoracoplasty it seriously interferes with the equilibrium of the shoulder. With modern techniques for thoracoplasty adequate collapse can be obtained without the aid of cleidectomy.

Cleidectomy as an independent operation might be considered an aid to give more room for an intrathoracic intervention or for re-operation by the anterior route for removal of re-ossified ribs in an attempt to cause an elective collapse of the Monaldi type. As a supplementary operation to posterior thoracoplasty it is perhaps needless, and certainly disturbs the equilibrium of the shoulder.

RICHARD H. MEADE, JR., M.D.

Durand, H.: Abscess of the Lung. Putrid Abscess
(Les abcès du poulmon Les abcès putrides) *Arch méd-chir. de l'appar respir*, 1937, 12 1

The first type of acute putrid abscess is that in which there are small multiple putrid abscesses occurring in one or more lobes of the lung as a result of a bronchopneumonic process. The second type shows only one or more large abscesses which may attain a size as large as an orange. Their form is very irregular, often with smaller areas branching off from the main cavity. The interior is filled with a thick, sticky, yellowish-gray, or yellowish-brown, liquid having a very offensive odor. From patients who have been checked by repeated roentgenograms it is apparent that such abscesses may make their appearance in a consolidated area with great rapidity. Several protocols are given to illustrate the pathological and microscopic changes in the lungs. These changes are shown further by photographs and photomicrographs.

Examination of the sputum from such patients shows anaerobic organisms of many varieties. Along with these anaerobes are found many spirochetes and fusiform bacilli. Many authors have stated that the necrotic process is initiated by the spirochetes and the anaerobes are secondary invaders. Due to the diversity of opinion on the subject and the impossibility of experimentally reproducing putrid pneumonia caused by spirochetes, Durand believes that a definite conclusion cannot be drawn at this time.

MARSH W. POOLE, M.D.

Durand, H.: Abscess of the Lung. The Pyosclerotic Type
(Les abcès du poulmon Les pyo-scléroses) *Arch méd-chir de l'appar respir*, 1937, 12 81

The progressive purulent excavation of abscess cavities with eventual death is not in all cases the history of these lesions. Other end-processes may be organization of the abscess and sclerotic fixation of the affected lung tissue without complete excavation.

The author describes at some length the preparatory phase of the abscess in the sclerosing process, beginning, as it does, with a degree of cleansing of the cavity, followed progressively by a "white pneumonia" and a "gelatinous pneumonia." On

histological study the wall will show many areas of milary abscesses, but simultaneously with their development a sclerosing, fibrous tissue reaction takes precedence throughout the entire abscess area, so that the purulent softening usually thought of in lung abscesses is progressively made less likely. A section of the report is devoted to gross and microscopic descriptions of the organized, sclerotic abscesses, various types of which may be (a) a fairly well organized abscess with a progressively expanding sclerosis, (b) an organized abscess with a combination of scar tissue, pus, and necrotic lung, a truly pyosclerotic abscess, (c) an abscess exhibiting atrophic sclerosis with large cavity formation and extensive loss of lung tissue, (d) a diffusely pox-like, sclerotic lung with generalized bronchial dilatation, (e) chronic, excessively large abscess cavities with sclerotic walls which occupy perhaps an entire lobe.

JOHN MARTIN, M.D.

Durand, H.: Abscess of the Lung (Les abcès du poulmon) *Arch méd-chir de l'appar respir*, 1937, 12 169

From his study of pulmonary abscesses, Durand concludes that such abscesses originate in a focus or multiple foci of necrosing pneumonia, which often involve a large part of a lobe of the lung or the whole lobe. Suppuration occurs in the necrotic tissue, and a process of sclerosis sets in around the areas of necrosis and suppuration or the abscess cavity, or cavities. Coughing may throw infected particles into the bronchi, which may thus reach the terminal bronchioles and originate new areas of necrosis and suppuration. In this way the entire lung or the greater portion of it may be destroyed.

The author points out that there is a great deal of resemblance between various types of pulmonary abscess and certain forms of pulmonary tuberculosis. The small localized abscess that heals spontaneously resembles the small foci of tuberculosis that cicatrize. The rapidly spreading necrosing pneumonia with formation of large abscesses resembles caseous tuberculosis with the formation of large cavities and rapidly fatal termination. In both instances the sclerotic process is inhibited and is of a very slight degree. Necrosing pneumonia that occurs in successive attacks with the formation of multiple, well defined abscess cavities resembles fibrocaceous tuberculosis, which also shows periods of remission and exacerbation, and in which there is also a combination of caseation and sclerosis. There is one difference that should be noted, the sclerosis in tuberculosis of this type is always associated with an increase in the elastic fibers, but this does not occur in non-tuberculous abscess formation. In some respects pulmonary abscess also resembles syphilis of the lung, both cause destruction of tissue, one by necrosis and the other by gumma formation; in both there is a marked tendency to sclerosis.

Gangrenous abscess of the lung may also be associated with tuberculosis; in such cases either tuberculosis may complicate an abscess in the process of

its formation or an abscess may develop in a lung that is the site of a tuberculous lesion. The two lesions may be definitely separated from each other and in different areas of the lung or solitary tuberculous lesions may develop in the area of necrosis. In cases of the first type both the tubercle bacillus and the anaerobic organisms and spirilla causing the abscess may be present in the sputum.

Bronchiectasis may be associated with pulmonary abscess and this association may be of various types. In one type the abscess formation is a complication of and is secondary to the bronchiectasis. The abscess formation is due to an invasion of the parenchyma by infected secretions from the dilated bronchi. In such cases the abscess is in the immediate vicinity of the bronchus and may communicate with it by a small fissure or the infection may have involved the parenchyma without any destruction of the bronchial wall.

In other cases the abscess may coexist with bronchiectasis but not be in definite relation with it. It may be in an entirely different area of the lung. In such cases the abscess formation is due to an infected embolus from the dilated bronchus.

In still another type the bronchiectasis and the abscess develop simultaneously as the result of a subacute bronchial infection. The lesion is characterized by the presence of an abscess, bronchial dilatation and plaques of sclerosis, and a subacute course. Various American authors designate this lesion as bronchiectatic abscess. The bronchial origin of the abscess is evident in such cases. At autopsy it is often difficult to distinguish this type of lesion from the first type in which an abscess formation in the parenchyma of the lung complicates a bronchiectasis of longer standing. A study of the clinical history is necessary to establish the correct pathological diagnosis. ALICE M. MEYERS

Brulé M. Hillemand P. and Gaube R. Air Cysts of the Lungs (Les kystes aérés du poumon). *Ann. méd. chir. Par.* 1937, 2: 140.

There are three different types of congenital cyst of the lung.

1. Cysts that are small or of moderate size. These are generally multiple and represent a true cystic disease of the lung, analogous to cystic disease of the kidney. There may be many of them scattered over both lungs. They are often latent clinically and diagnosis can be made only by roentgen examination. They show round cavities filled with air and surrounded by a delicate line or sometimes a double outline. The normal lung outline cannot be seen if there are many cysts. These cysts may or may not be permeable to lipiodol. They may become manifest later from infection and the patients may suffer hemoptysis. Sometime there are only one or two cavities with classical dilatation of the bronchi. Their clinical and roentgen pictures and their course differentiate them from tuberculous cavities.

2. Giant cysts or balloon cysts simulating pneumothorax. Diagnosis is possible from a minute

observation of the roentgen picture and the course of the disease. The absence of any signs of tuberculosis, the abnormal chronicity of the condition and persistence of the cyst without any change testify against pneumothorax. It is important to make the diagnosis as puncture is absolutely contra indicated in these cases.

3. Suppurating cysts which show the clinical picture of bronchopulmonary suppuration with a cyst containing air and fluid, the exact diagnosis of which is very difficult. Pneumotomy with drainage is indicated and sometimes diagnosis is made only on operation.

These different types of congenital cysts of the lung must be differentiated from secondary pseudocystic formations which may result from the transformation of bullae of emphysema or different processes chief among them being obstructive emphysema.

1. Pathological examination of the walls of the cysts shows tissue of the bronchial type. The cysts are therefore embryonic dysplasias often associated with other congenital malformations. They are also familial. A case is cited in which six members of a family had congenital lesions of the thorax: lungs, pulmonary artery and vascular system. Two of the family had gas cysts of the lung.

These cysts therefore belong in the same category as dilatations of the bronchi, the congenital origin of which has been proved beyond doubt in many cases. They are only different degrees of malformations of the same origin. The moderate stage of ordinary bronchiectasis is the one most frequently seen by the clinician. AUDREY GOSS BLOOMAN M.D.

HEART AND PERICARDIUM

Fischer H. A Procedure for Decorication of the Heart in Callosus Pericarditis (Zur Durchführung der Herzentarrung bei schwerer Perikarditis). *61. Tag d. deutsch. Ges. f. Chir.* Berlin 1937.

Further development in this field of surgery will be possible only when the surgeon pays more attention than formerly to the physiological and clinical phenomena, the interpretation of which affords guidance in the operative procedure and determines the result.

It must be understood that even for the exposure of the organ conditions are entirely different from those in a case of injury to an otherwise healthy heart. The cardiac muscle is injured through a high degree of inactivity if through no other cause. Furthermore the decorication greatly alters conditions. Care must therefore be taken to avoid adding any extra burden to the heart.

For this reason the author long ago abandoned absolutely the practice of cutting a large window in the thoracic wall. In addition to increasing the operative trauma this procedure decreases the suction function of the thorax and makes respiration difficult and thereby reacts injuriously on the work of the heart. Besides it is entirely unnecessary since it is possible to obtain a wholly sufficient exposure for

control by the eye with a method that causes less damage and produces a minimum of disturbance in the physiological unity of circulation and respiration.

The idea that a large thoracic window is a protection against recurrence caused by fresh adhesions is wholly without foundation.

If decortication is thoroughly carried out, the organ will not again become imbedded in indurations.

It is absolutely necessary to avoid injury to the pleura and mediastinal space, such as easily occurs with extensive fenestration of the thoracic wall.

Pneumothorax casts a heavy load on the circulation of a patient whose heart is in this condition.

In the decisive phase of the operation, the decortication itself, the heart muscle is brought under greatly altered physiological conditions. The removal of the masses of callus embracing the heart induces changes in the metabolism and creates a certain tendency to edema in the musculature which has long been largely inactive. The liberation of the organ causes an increase in the functional demands made upon it.

These changes in the physiological conditions and function of the heart, together with the large amount of added work thrown on it, require full consideration in planning the operative procedure.

The viewpoints which should guide this procedure are comparable with those which prevail in brain surgery. Here, too, dangerous fluctuations threaten, caused not alone by the changed physiological conditions in the heart muscle but above all by the functional demands on the organ.

The freeing of the heart from its mantle of callus is therefore to be carried out a little at a time with intentional slowness, so that the organ may accustom itself gradually to the changed conditions as decortication proceeds.

To meet the requirements outlined above, the author recommends his "two-stage decortication." The operative procedure is as follows:

First, no large thoracic window is cut. The mediastinum is exposed in the region of the space that is free of pleura by removal of the attachments of the fifth and sixth ribs and half of the adjoining sternum. Through this opening, the pleura is cautiously pushed aside. This can be easily accomplished toward the thoracic wall by working under the protection of the transverse thoracic muscle.

Next the attachment of the fourth rib is likewise removed with the corresponding part of the sternum and, step by step, the removal of the ribs is carried out.

There is usually no difficulty about detaching the pleura from the pericardium, because, as a rule, it is thickened with indurations. If difficulties are encountered, however, the pleura should not be wrenched loose from the indurated field by force, but the adherent areas and superficial layer of underlying callus should be cut away together.

A tear of the pleura must be avoided at all costs.

If extensive inseparable pleural adhesions are present a procedure is recommended such as needs

no special description in combination with the "two-stage decortication."

This two-stage decortication has its basis in the following observed data. After the pericardial callus has been divided, one sees the divided callus open and widen out in the manner of a fissure as the heart presses out against it. It is then frequently believed that the muscular wall has been reached. As one proceeds one finds that this is a layer lying between the outer pericardial and the epicardial portion of the callous mantle. If now the whole layer of callus is removed down to the heart muscle, there is a sudden freeing of the muscle, which bulges out, often to a dangerous degree. The immediately appearing marked acceleration and irregularity of the heart's action show the disturbances produced by this sudden release. The danger of over-stretching threatens.

To avoid these dangerous sudden changes of pressure, the outer layer of callus must first be removed by itself. This removal is effected with comparative ease, and often blunt means alone are sufficient to lift the outer layer *in toto* away from the deeper layer.

If it had been found impossible to displace the pleura, it can now be left in connection with this layer of the callus.

The loosening of this upper layer begins in the region of the right ventricle. Under gradual enlargement of the window in the wall of the thorax, the separation is continued toward the left, till the left half of the heart lies free.

Now the removal of the deep, epicardial callous layer is begun and continued from this point to the right ventricle.

To achieve a lasting result, it is well worth while to free the right ventricle as well as the left from its mantle of callus. The danger of overstretching in the region of the right ventricle, which was feared in the case of damaged heart muscle, is without doubt much diminished by this procedure of gradual release of pressure in two-stage decortication.

After the decortication of the ventricles, a very important measure remains to be undertaken, the freeing of the base of the heart.

In his observations the author discovered that a hard, constricting band of callus remained above the decorticated and forward-pressing ventricles. It was clear that it hindered the flow of blood.

The decortication of the base of the heart is a dangerous undertaking, since the thin wall of the auricles ruptures easily. The ring of callus around the base of the heart can be opened between the auricles without danger, if the course of the pulmonary artery is followed.

The author has been able to observe how the ring of callus was, as it were, burst apart and the base of the heart freed from its constriction.

In résumé, it may be said that two things stand in the foreground as regards the further development of surgery of the heart: the physiologicotechnical factors which have to do with the aids to circulation, the protection and maintenance of which require at-

tention even in the stage of exposing the operative field and the avoidance of the dangerous variations in pressure during the process of decortication. With attention to these problems it should be possible to reduce greatly the number of failures. Furthermore, the decortication can be carried out much more thoroughly and fully which is naturally of decisive importance for the permanent success of the operation.

FLORENCE A. CARPENTER

Bjggild D. Mediastinopericarditis Fibrous Pericarditis with Particular Attention to Its Surgical Treatment (Fibroese Mediastinopericarditis (fibroese Perikarditis) mit besonderer Berücksichtigung ihrer chirurgischen Behandlung) *Ugeskr f Læger* 1937 p 328

Fibrous pericarditis is not a particularly rare disease. About one third of the cases have a tuberculous origin, one third a rheumatic origin and the remainder are of an unknown origin. The condition occurs predominantly in later childhood and the early years of adult life but may develop at any age. Any case of acute pericarditis can develop into a fibrous mediastinopericarditis after the acute phase has run its course. It may take several years before this change may occur. The fibrous deposits on the pericardium may be very extensive and may lead to adhesions to the neighboring organs such as the vascular trunks, the esophagus, and the pleura. In rare cases calcium is deposited in large amounts and encloses the entire heart producing what is known as heart en cuirasse. The deposit of calcium occurs particularly after traumas and in cases of tuberculous origin. Another complication is shrinkage of the fibrous masses which compresses

the heart. Phenomena of degeneration and valvular defects, stenoses of the circulatory system in various organs and ascites and edemas are further complications. The clinical findings and diagnosis are discussed at length. The various operative measures for separation of the adhesions and removal of the pericardial deposits are described. There are various opinions as to how much of the surface of the heart need be exposed. For the simpler cases the author recommends planning the details of the operation according to the conditions revealed by the operative exposure. He advises that particular attention be given to the removal of any obstacles to the systole of the heart which may have been produced by the shrinking of the pericardium. For the rest the operation should be limited to essentials so as not to expose the patient to unnecessary dangers. It is best to excise a piece of pericardium, the size of the palm of the hand, over the left ventricle and to undertake the freeing of the heart itself through this window. A small drain is then inserted and the pericardium is closed by sutures. Drainage is necessary because of the abundant secretion in the first period following the operation.

The author describes 2 personal cases of fibrous pericarditis and the operation performed in each case. Both cases were of the exudative tuberculous type of pericarditis. In general the prognosis depends on the mode of origin. A tuberculous origin gives the worst prognosis.

The best results of treatment are seen in cases which develop slowly. The prognosis is greatly improved by early operation before the heart muscle has suffered too great injury.

(HÅAGEN) FLORENCE A. CARPENTER

SURGERY OF THE ABDOMEN

A CRITICAL REVIEW OF THE TREATMENT OF ACUTE CHOLECYSTITIS

Including a Tabulation of the Experiences of the Surgical Clinic
at the University of Minnesota

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THE proper management of acute cholecystitis constitutes a problem which has attracted wide attention and has provoked much discussion among members of the medical profession. The lack of an adequate understanding of the physiology of the gall bladder and of the pathological changes occurring in this organ when it is diseased has contributed to the confusion which apparently exists concerning proper treatment.

While there is still much to learn, evidence has been accumulated to show that mechanical, chemical, and bacteriological factors may each contribute to the production of gall-bladder disease. According to Andrews (2), mechanical factors appear to be the most important, and upon this basis he has recently presented the following classification:

- 1 Normal state of the gall bladder
 - Slight infiltration often seen
 - Cholesterosis
 - Presence or absence of stones
 - (The presence of these signs formerly often led to a diagnosis of chronic cholecystitis)
- 2 Reaction of acute obstruction of the cystic duct
 - Uncomplicated type (formerly called chronic cholecystitis)
 - Infective type (formerly called acute cholecystitis)
 - Empyema (?)
 - Type with vascular damage (formerly acute cholecystitis)
 - Mild cholecystitis
 - Ulcerative cholecystitis
 - Gangrenous cholecystitis
- 3 Reaction to intermittent obstruction of the cystic duct
 - Normal condition between attacks
 - Persistent irritation (usually mild)

From the Department of Surgery, University of Minnesota

- 4 Reaction to chronic obstruction of the cystic duct
 - Uncomplicated type (formerly called chronic cholecystitis)
 - Acute reinfection
 - Mild
 - Empyema (?)
 - Hydrops
- 5 Reaction to obstruction of the common duct
 - Acute or recent type (dilated and thin-walled gall bladder)
 - Chronic type (shrunken and fibrosed gall bladder)
- 6 Neoplasms

Andrews (2) states that closure of the cystic duct from any cause brings on an infection of the gall bladder which lasts for a variable length of time. The cystic duct may be occluded by a calculus, by spasm resulting from chemical irritation or allergic disease, or by transient infection from the blood, lymph, liver, or bowel.

Normally, the gall bladder has three principal functions (Ivy 51): absorption, secretion, and motor activity. Absorption greatly exceeds secretion so that, ordinarily, occlusion of the cystic duct results in a decrease in the volume of the gall-bladder contents. These functions, however, may be disturbed by the presence of acute inflammation so that secretion may be increased and absorption and evacuation may be inhibited (Ivy and Bergh 53). Under such circumstances distention of the gall bladder may occur to such an extent that the blood flow is compromised, and areas of gangrene or perforation may develop. Occasionally actual pressure exerted by a stone in the cystic duct may interfere with the venous return from the gall bladder and cause the tissue to become necrosed (Denton 26, Homans 49), however the anatomical arrangement of the vessels makes such an occurrence very unusual (Kreider 58).

Acute inflammation of the gall bladder has been likened to acute appendicitis by those surgeons who advocate early operation in cases of acute cholecystitis. It would appear however, that such a comparison is not justified since the two organs are quite different when considered bacteriologically, anatomically, and physiologically. The gall bladder contents are sterile in a high proportion of cases and even when bacteria are present the count is usually low. The appendix on the other hand has the rich bacterial flora of the intestine (Wangensteen et al 104). The gall bladder also has a greater volume and greater distensibility than the appendix and it is located in a more protected region, being surrounded and readily isolated from the general peritoneal cavity by the liver stomach and duodenum colon, and omentum. Furthermore the absorptive function of the gall bladder greatly exceeds its secretory function whereas it appears that secretion exceeds absorption in the human appendix (104). As a result perforation of the gall bladder into the general peritoneal cavity is a relatively rare occurrence (Deaver and Burden 25 Graham et al 38 Larson 60) whereas perforation of an acutely inflamed appendix is notably common.

Once an acute cholecystitis has developed, it may subside spontaneously or it may progress. Experience has shown that *very few cases fail to subside under proper medical treatment*, but occasionally the pathological process progresses to gangrene or rupture of the organ. Gangrenous cholecystitis follows vascular damage which may result from distention of the gall bladder from actual compression of vessels by a stone impacted in the cystic duct or rarely from actual torsion. The gall bladder may perforate into an adjacent viscus with the development of an internal biliary fistula, it may perforate into a walled off space in the sub hepatic region with the formation of a localized abscess or, rarely, it may perforate into the general peritoneal cavity.

Unfortunately, as has been emphasized by Mentzer (70 71, 72), Touroff (97), Heuer (44) and others, it is often difficult, if not impossible to judge clinically whether the pathological process is progressing or regressing. For this reason a number of surgeons Babcock (5), Douglas (27) Finney (31), Finsterer (32), Glenn (35), H. F. Graham (39), Heuer (43, 44), Heyd (46), Kirschner (56), Lipshutz (61 62), Lund (64), R. H. Miller (73, 74), Pfeiffer (77), Schoenbauer (87), Stone and Owings (92), Taylor (93), Walters (99), Walton (100, 101), Zierold (115), Zimmlinger (116), and others, have advocated immediate or early operation in cases of acute cholecystitis. It is

their contention that the risk of operation in the acute stage is less than the risk of the development of fatal complications.

On the other hand Everts Graham (36, 37, 38), Behrend (8), and others (Andrews 4 Branch and Zollinger 14, Bruggeman 15, D'Abreu 24) have repeatedly emphasized the danger of operation during the acute stage, the mortality from such operations being approximately 10 per cent (Table I). This mortality is far in excess of the general mortality reported by those who advocate conservative therapy during the acute stage. A few series of cases have been reported however, in which the operative mortality has not been excessive (Tables I and II), especially when the operation has been carried out within forty eight hours after the onset of the disease.

TABLE I—THE MORTALITY OF OPERATIONS FOR ACUTE CHOLECYSTITIS

Author	Year	Cases	Deaths	Mortality Per cent
Love R. J. M.	1920	28	8	21
Kneist H.	1921	117	12	10.3
Müller R. H.	1921	100	17	17.1
Graham H. F.	1921	195	1	0.5
Whipple A. O.	1921	150	21	14.0
Zinner M. M.	1921	80	7	8.8
M. L. S. H.	1921	71	16	22.5
Fowl R. S.	1922	245	26	10.6
Feit G. H.	1922	45	10	22.2
Smith M. E.	1922	107	10	9.3
Judd E. S. and Phillips J. R.	1922	14	1	7.1
Stein C. R.	1922	200	12	6.0
Graham R. R.	1922	6	1	16.6
Watt C. M.	1922	78	6	7.7
Black J. M.	1922	4	3	75.0
Wakeley C. F.	1922	20	6	30.0
McKenry J.	1922	115	13	11.3
W. H. and Rothberg	1923	3	3	100.0
Taylor F.	1923	19	1	5.3
W. L. Lohmeyer and Goodwin	1923	140	7	5.0
N. C. H. A.	1923	14	0	0.0
W. L. and M. L. Lohmeyer	1923	70	3	4.3
Heuer G. J.	1923	153	5	3.3
S. Lohmeyer L.	1923	70	5	7.1
Total		504	100	19.7

*Only those cases operated upon early are listed here. Love's total mortality in 107 cases was 14.0 per cent.
 †No. in those who operated upon as emergency cases is listed. The total mortality in 500 cases was 4.7 per cent.
 ‡A calculation of cholecystitis only.

TABLE II—THE MORTALITY FOLLOWING EARLY OPERATION FOR ACUTE CHOLECYSTITIS

Author	Cases	Deaths	Mortality in Per cent	Cases	Deaths	Mortality in Per cent
	Operated upon within 24 hours			Operated upon after 24 hours		
Mentzer	21	8	38 0	21	2	9 5
	Operated upon within 48 hours			Operated upon after 48 hours		
Graham, H F	20	1	5 0	178	11	6 2
Zininger	12	0	0	23	3	13 0
Taylor	19	1	5 2	83	16	19 2
McKenty	14	0	0			
Heuer	153	5	3 2			
Totals	218	7	3 2	284	30	10 5
	Operated upon from third to fifth day			Operated upon after fifth day		
Zininger	15	1	6 6	8	2	25 0
Taylor	20	1	5 0	63	15	23 8

Heuer (44) objects to comparing the mortality rate following operation for acute cholecystitis with that following operation in a general series of gall-bladder diseases, since in a general series the cases of chronic cholecystitis outnumber the cases of acute cholecystitis.

If one could be certain that a gangrenous cholecystitis were present, there would be no cause for delay, and when subsidence fails to follow conservative treatment, operation must be undertaken. It is true that in a few instances time is lost by such delay, and occasionally one is misled by the clinical picture to believe that the process is subsiding when it is actually progressive (Heuer 44, Mentzer 70, 71, 72, Touroff 97). Even so, the proponents of the conservative type of therapy believe that the danger of operation in the acute stage exceeds the danger of such a complication.

In this clinic, under the direction of Owen H. Wangenstein, it is our policy to treat acute cholecystitis conservatively, to wait for the process to subside before operation is undertaken, unless perforation seems imminent or has already occurred. When our results, which are discussed later under a separate heading, and those of others pursuing a similar policy are compared with those of surgeons operating in the acute stage (Tables I, II, and III), such a policy appears to be justified.

OPERATION DURING THE ACUTE STAGE

As is apparent from the figures presented in Table III, the surgical staff at the University of Minnesota Hospitals have had little experience with operation upon cases of cholecystitis in the acute stage. Since 1933, however, there has been

an increasing tendency on the part of some surgeons to operate early upon cases of acute cholecystitis. A few advocate immediate operation while others advise delay of a few hours in order to allow time for preparation of the patient.

Cholecystectomy has been performed most frequently as the *operation of choice*. Technically, the separation of the gall bladder from its bed in the liver is often made easy by the pericholecystic edema (Heuer 44, Lipschutz 61). This same swelling and reaction in the region of the junction of the cystic and common bile ducts, however, makes working in that region more hazardous (Coller and Boys 20, Walters 99). Fresh adhesions are easily separated, but old adhesions, which may

TABLE III—MORTALITY OF 532 SURGICALLY TREATED CASES OF NON-MALIGNANT BILIARY TRACT DISEASE AT UNIVERSITY OF MINNESOTA HOSPITALS.

Procedure	Cases	Deaths	Mortality in Per cent
Cholecystectomy (chronic and subsided cases)	435	8	1 8
Emergency cholecystostomy (acute cholecystitis)	5	2	40 0
Cholecystostomy (chronic cholecystitis)	10	1	10 0
Removal of common duct stones	73	9	12 1
Repair of stricture of common duct (Cases associated with jaundice)	9	2	22 2
Total	532	22	4 1

¹Patients in whom perforation seemed imminent or had already occurred.

²The death resulted from sepsis from an abscess in the lesser omental bursa, present at the time of operation.

³Jaundice was present at the time of operation in 8 of the 9 fatal cases, and was present in two thirds of the entire series.

be present from previous attacks add greatly to the difficulty

Cholecystostomy is usually reserved for those patients who seem too ill to withstand cholecystectomy. The most important objection to cholecystostomy is that secondary operation is so often required in order to remove an organ which still may cause symptoms. Cholecystographic studies in man have demonstrated that the gall bladder returns to a normal state after cholecystostomy in only a small percentage of cases. Furthermore, it should be remembered that the presence of an external biliary fistula favors the development of secondary infection of the biliary tract. In dogs, cholecystostomy usually leads to infection of the biliary passages in from two to three weeks (Ivy and Bergh 53).

In spite of these objections, cholecystostomy is indicated in a small group of cases in which the patient is elderly or in poor general condition, or in which the extent of the pathological process makes a more extensive procedure hazardous (Walters 99).

Preferably cholecystostomy is performed as a single stage procedure, but occasionally it may be advisable to carry out a multiple stage operation as suggested by Bloch. Recently Babcock (5) has revived interest in multiple stage cholecystostomy and has developed a technique for such an operation which he describes as follows:

"Through a rather small vertical upper rectus or a muscle-splitting incision the large distended gall bladder is exposed and, if free, is immediately tilted outward through the incision, where it is held by closing the wound about it without drains. If on account of obesity or fixation of the gall bladder the fundus cannot thus be externalized, a special large glass tube three to six centimeters in diameter and with a rounded lower edge is introduced to the side or the fundus of the gall bladder against which it is held by fine alloy steel sutures brought out through the appropriate openings in the glass tube. The wound is then closed about the tube without additional drainage. Forty-eight or more hours later a large button is burned out of the wall of the exposed gall bladder with a fine cautery point. Some days later gentle attempts are made to remove the contained stones. When the tract is narrow the stone may be exposed through an open cystoscope or urethroscope and if impacted softened by applying small cotton swabs saturated with ether to dissolve the cholesterol to permit its fragmentation.

Hollenberg and Eikner (48) have also described the removal of stones through a cholecystostomy stoma by means of cholecystoscopy.

Partial cholecystectomy has been recommended as being feasible in some cases in which the classical cholecystectomy would be difficult or hazardous, and it presents the advantage over cholecystostomy that secondary operation is not required. It should not, however, be employed as an operation of election but should be reserved for the occasional case in which the indications seem clear. Several types of partial cholecystectomy have been advised. Pribram (79) has developed a procedure consisting essentially of opening the gall bladder and destroying the mucosa by cautery "mukoklase." Others have removed a portion of the gall bladder wall and have used a method of electrocoagulation to destroy the remaining mucosa (Thorek 94, 95, 96 and Whitaker 109, 110, 111). Chemical destruction of the remaining mucosa has been practiced by Gatch (30), while Ritchie (82) and others have used knife dissection for removing the mucosa left after excision of a portion of the gall bladder wall.

The question of drainage after operations on the biliary tract is still debated and Mirizzi (75) has considered it at length in his monograph dealing with 'ideal cholecystectomy. The danger of bile escaping into the peritoneal cavity is the chief indication for drainage. Such an escape of bile may result from:

- 1 Shipping of the ligature on the cystic stump due to increased pressure within the biliary tree. The increased pressure may be due to an organic obstruction or it may be due to a functional spasm at the sphincter of Oddi.
- 2 Necrosis of the cystic stump.
- 3 Leakage from anomalous biliary ducts.
- 4 Biliary oozing from lesions of the hepatic parenchyma.
- 5 Injury of the extrahepatic biliary ducts during operation.

The gall bladder contents are so often sterile and the peritoneal resistance is so great that spillage at the time of operation is usually not serious. In some cases however severe infections follow spillage and drainage probably decreases the danger of the development of such a complication.

Mirizzi lists the disadvantages of drainage as:

- 1 The danger of adhesions. It must be admitted that there is no proof that they can be prevented by the omission of drainage but Mirizzi believes that the formation of adhesions is favored by the presence of drains.

- 2 The danger of postoperative hemorrhage. Occasionally especially in jaundiced patients secondary hemorrhage occurs when the drain is removed.

3. The influence on the postoperative course. Mirizzi believes that the convalescence is less frequently complicated by paralytic ileus, vomiting, pulmonary disease, and thrombosis when drainage is omitted.

In the Surgical Clinic of the University of Minnesota Hospitals drainage of the peritoneal cavity is always instituted after cholecystectomy, the soft rubber drain being brought through a stab wound in the right hypochondrium. We have found that such a procedure is a safeguard which does no harm (Ransom and Bergh 8r, Wangenstein 102).

CONSERVATIVE THERAPY DURING THE ACUTE STAGE

Conservative measures employed in the treatment of acute cholecystitis aim to alleviate suffering, to improve the general condition of the patient, and to produce conditions favoring subsidence of the acute process.

Alleviation of pain. Biliary-tract pain results from spasm or distention. McGowan, Butsch, and Walters (16, 17, 66, 67) have demonstrated that when biliary colic results from spasm it may be relieved by the administration of amyl nitrite or glyceryl trinitrate, and we have found that these drugs may be useful in relieving the pain in some cases of acute cholecystitis. In other cases it is necessary to resort to morphine, but since that drug causes spasm of the sphincter of Oddi, the relief is entirely central.

Injection of calcium salts also has been suggested as a means of relieving biliary-tract pain (Hochman 47). Such salts do not have a relaxing effect on the sphincter of Oddi (Snell et al 89), but Hochman states that the calcium raises the threshold for pain sensibility.

The application of hot packs to the abdomen often makes the patient more comfortable. The mechanism of this action is not known, but it is possible that the heat decreases the tone and motility of the gall bladder (Ivy 52).

Other measures tending to decrease the tone and motility of the gall bladder will be discussed later.

Improvement of the general condition of the patient. Since there may be hepatic damage in cases of acute cholecystitis (Cantarow 18, Ivy 52), glucose should be given intravenously to increase the glycogen reserve of the liver. Fluids should be given liberally to combat dehydration. In debilitated patients, especially in the presence of jaundice, blood transfusions are of value.

Measures to produce conditions favoring subsidence of the acute process. Rest is the most important factor favoring subsidence of acute inflam-

mation (Wangenstein 103). In the case of acute cholecystitis the activity of the diaphragm, the activity of the bowel, and the activity of the gall bladder itself are unfavorable influences.

There is a reflex splinting of the diaphragm and, to a certain extent, intestinal movement is inhibited. Even under a regimen of starvation, however, a certain amount of intestinal activity is necessary to propel the fairly large volume of secretions which are poured into the upper portion of the alimentary canal. In very acute cases of cholecystitis this factor should be combated by the employment of continuous suction applied to an intubing duodenal tube as described by Wangenstein (103).

It has been our experience that the use of suction often relieves pain in cases with acute abdominal disorders. In cases of conservatively treated appendicitis with perforation and peritonitis, for example, medication for relief of pain is seldom necessary. Narcotics are avoided in cases in which the nature or extent of the intra-abdominal pathological process is still in question, in order that symptoms which might give valuable information concerning the patient's condition are not masked. In severe biliary colic which cannot be relieved by amyl nitrite, however, it may be necessary to resort to the use of opiates.

In less severe cases the patients may be allowed to take carbohydrates by mouth as they do not stimulate motility of the gall bladder. Ivy (52) suggests the feeding of cereal gruels, starches, and sugars, especially in the form of corn syrup. He advises adding gelatine to the cereal because its glycin content will not only provide sugar for glycogen formation, but will improve the detoxicatory function of the liver. He states that calcium and Vitamins A and D should also be given.

The chief stimulus of gall-bladder contraction is the hormone, cholecystokinin, and the most effective excitants of hormone production are acids and fats acting in the upper part of the intestine (Ivy and Bergh 53). In order to keep the gall bladder at rest, therefore, fats, acid fruit juices, and meats, which stimulate the secretion of gastric juice, should be withheld (53).

Magnesium sulphate or magnesium oxide is sometimes given because of the relaxing effect these substances exert on the sphincter of Oddi. There is some evidence to indicate that magnesium causes a slight contraction of the gall bladder (Boyden and Birch 13) as well as relaxation of the sphincter, in which case it might be well to avoid its use in acute cholecystitis.

Biliary antiseptics are apparently of no value, and Ivy (51) states that bile salts should not be given in cases of acute cholecystitis.

Management after subsidence of the acute process
After subsidence of the acute process a chronic cholecystitis often remains, but this is not invariably the case. The gall bladder may resume its normal functions, and since removal of a functioning gall bladder leads to morphological and physiological changes in the biliary passages and liver, one should not remove a stone free gall bladder which concentrates, at least not until medical control has been tried (Bergh et al 9). The changes which follow removal of a functioning gall bladder are (1) slight hepatitis, (2) dilatation of the biliary ducts and (3) disturbances of function of the choledochoduodenal sphincter mechanism (9).

On the other hand, if the gall bladder has been so permanently injured that it does not become visible when the Graham Cole test is applied, a functional cholecystectomy has already been performed from the physiological point of view. Consequently no physiological change or damage would be expected from removal of such an organ, and if it be harboring infection or stones cholecystectomy is certainly indicated (9). Furthermore, when it is indicated surgical treatment should not be delayed too long since complicated pathological processes may develop and greatly increase the risk (Boyce et al 12). The increased risk following long delay has been adequately demonstrated by the figures presented by Enderlen (19) and Hotz (50).

CONSERVATIVE THERAPY AS CARRIED OUT AT THE UNIVERSITY OF MINNESOTA HOSPITALS

In the Surgical Clinic of the University of Minnesota Hospitals we follow the conservative policy of delaying operation until subsidence of the acute process unless perforation appears to be imminent or has already occurred. Bed rest, of course, is imperative. Subsidence of the inflammation is favored by the measures already listed: suction applied to an intubated duodenal tube, a starvation regimen during the acute stage and the application of hot packs to the abdomen. Glucose and fluids are given in liberal quantities. The amount of saline solution which must be given can be judged by observing the specific gravity of the urine (Wangensteen 103) since an excess of sodium chloride will cause water retention with a consequent rise in the specific gravity of the urine. As a rule fluids are given intravenously twice daily, glucose being given in saline solution once and in triple distilled water once daily but

these procedures are governed entirely by the requirements of the individual patient.

Pain caused by spasm can often be relieved by the administration of amyl nitrite or glyceryl trinitrate, but sometimes one must resort to the use of opiates in order to obtain relief.

Surgical treatment during the acute stage is almost never necessary if the plan of treatment outlined above can be instituted sufficiently early. Should the process progress or fail to subside however, operation is indicated.

The patient is confined to bed until the abdominal pain and associated tenderness and muscle spasm have subsided and the mass has disappeared. Likewise the temperature, pulse, and leucocyte count should remain at normal for some time before the patient is allowed to be up.

After subsidence of the acute process the patient becomes ambulant, and it is best to wait several weeks before operation is undertaken unless there are recurrent acute attacks at frequent intervals. It is, therefore, our policy to dismiss the patient from the hospital with instructions to return in six or eight weeks for consideration of operation. If at the end of that time the gall bladder shows signs of permanent damage, it is removed—the operation of cholecystectomy usually being performed by one of the residents.

In most cases the acute inflammatory process is found to have subsided at the time of operation, and classical cholecystectomy is usually accomplished without difficulty. The gall bladder is removed from the cystic duct toward the fundus after careful visualization of the essential structures and separate clamping, dividing and ligating of the cystic duct and the vessels. Occasionally the gall bladder still shows signs of active inflammation being red, edematous and tense, and it may be expedient to begin the removal at the fundus. Sometimes one finds evidence of a previous perforation of the gall bladder such as a pericholecystic abscess or gall stones free in the peritoneal cavity but such findings are not usual.

Postoperatively the position in bed is important. Wangenstein (103) advises against the use of the Fowler or semi Fowler position and states that in the early postoperative period the low position of the head is best. Later after complete recovery from the anesthetic the patient is placed in the horizontal position.

The use of suction applied to an intubated duodenal tube prevents the development of distention and adds to the comfort of the patient. Fluids and glucose are given intravenously.

In an effort to prevent the development of pulmonary complications the position of the patient

is changed at frequent intervals and deep breathing and coughing with the abdomen supported is encouraged. In this way the benefits of hyperventilation may be obtained without resorting to the use of carbon dioxide and oxygen mixtures. An inexpensive and effective method of carrying out hyperventilation by prolongation of the respiratory dead space has been recommended for clinical application by Duomarco and Diaz Romero (28).

When this conservative plan is followed, reoperation is seldom necessary since substitution of cholecystostomy for cholecystectomy is rarely required. Furthermore, when operation is performed in the interval, there is less likelihood of overlooking stones in the common duct, and if one wishes, one may carry out x-ray studies, cholangiography, during the conduct of the operation.

RESULTS OF CONSERVATIVE THERAPY AT THE UNIVERSITY OF MINNESOTA HOSPITALS

In February 1937, Ransom (81) reviewed the cases of 1,247 patients with non-malignant biliary-tract disease who had been admitted to the University of Minnesota Hospitals during an eight-year period. Among this group there were 33 deaths, a total mortality of 2.6 per cent.

Mortality of patients treated medically. Six of the patients who died had not been subjected to operation. The average age of these 6 patients was 61.5 years. Two patients with chronic cholecystitis and cholelithiasis died from acute pancreatic necrosis, 2 died shortly after admission from unrecognized acute cholecystitis with perforation and peritonitis, 1 patient, who had previously had a cholecystectomy, suffered from a stricture of the common bile duct and an associated cholangitis and died from the biliary-tract infection a few hours after admission, and the sixth patient suffered from chronic cholecystitis and cholelithiasis, but died from pneumonia. None of these deaths should be charged to failure of conservative treatment.

Mortality following cholecystectomy in the interval or chronic stage. In Table III, 532 surgically treated cases, a portion of the series reported above and with a total mortality rate of 4.1 per cent, are reviewed. The mortality following cholecystectomy, however, including those cases in which choledochostomy was performed, but in which no common duct stones were found, was 1.8 per cent. In 151 of the group of 435 patients treated by cholecystectomy, appendectomy also was performed. In the latter group the mortality was 1.2 per cent and indicated that removal of the appen-

dix at the time of cholecystectomy is a justifiable procedure.

The average age of the patients upon whom cholecystectomy was performed was 42.1 years, while the average age in the 8 fatal cases was 49.4 years.

The causes of death following cholecystectomy included peritonitis, pneumonia, pulmonary embolism, cardiac decompensation, and operative shock.

Mortality following emergency cholecystostomy in the acute stage. Emergency cholecystostomy was done in 5 cases of acute cholecystitis in which perforation seemed imminent or had already occurred. There were 2 deaths among these 5 cases. One patient, aged eighty-one, who was operated upon shortly after admission, the third day of her illness, died within a few hours after operation. The other, a sixty-four-year-old woman, had been treated for several weeks for duodenal ulcer when she developed an attack of acute cholecystitis. This was not recognized at once, and perforation of the gall bladder occurred before the patient was seen by the surgical staff. Cholecystostomy was then undertaken, but the patient died from generalized peritonitis the day following operation. Post-mortem examination revealed the duodenal ulcer to be healed.

Mortality following cholecystostomy in the chronic stage. Cholecystostomy was performed in 10 cases of chronic cholecystitis, chiefly in elderly or debilitated individuals, with 1 death. In the fatal case, that of a patient forty-seven years of age, death resulted from sepsis from a large abscess which was present in the lesser omental bursa at the time of operation.

Mortality following operations for removal of common-duct stones. There were 73 operations for removal of stones from the common bile duct with 9 deaths, a mortality of 12.1 per cent. Jaundice was present at the time of operation in 8 of the 9 fatal cases, whereas in the entire series of cases of choledocholithiasis jaundice was absent in 30 per cent. The average age of the patients who died was 54.2 years. Among the causes of death were: postoperative hemorrhage, pneumonia, bacterial peritonitis, bile peritonitis, subphrenic abscess, and hepatic insufficiency.

Mortality following operation for biliary stricture. Among 9 patients operated upon for biliary stricture, 2 died, both were in very poor condition pre-operatively. The average age for this series was 43.2 years, and the 2 who died were aged thirty-four and forty-four years, respectively.

Consideration of the age factor. Enderlen (29), in considering the age factor, found the mortality to

be approximately five times greater in patients past forty years of age than in patients below that age. Our figures agree roughly with his in that the mortality following cholecystectomy in our series of cases was 0.5 per cent in patients below forty and 3.1 per cent in patients over forty years.

DISCUSSION

Although there has been much discussion as to whether operation should be undertaken early for acute cholecystitis or whether one should wait for the acute process to subside, there is still no agreement among surgeons as to the proper procedure. All agree, however, that there is such a variance among cases that the procedure for each case must be decided after careful study of the individual patient, and cannot be based on generalizations.

In the past, operations for acute cholecystitis have been attended with a very high mortality (Table I). Recently it has been suggested that this mortality can be substantially reduced by earlier operation (Whipple 108), and the figures in Table II show that in a small series of cases operated upon within the first forty eight hours the mortality was 3.2 per cent, not much higher than that for cholecystectomy in the interval or chronic stage. Most recent figures indicate that the mortality following cholecystectomy in the chronic stage is less than 2 per cent. Although operation within the first forty eight hours therefore, appears to be fairly safe, operation after that time during the acute stage is attended with a much higher mortality (Table II).

From the standpoint of spreading infection early operation is safe in most instances since it has been shown that bacteria do not play an important part in the majority of cases (Andrews 4). On the other hand as Andrews has pointed out, some cases are definitely infected and when these are operated upon in the acute stage a serious flare up may follow. Andrews states that it was the occurrence of such flare ups that caused surgeons in the past to abandon operation in the acute stage.

In the Surgical Clinic of the University of Minnesota Hospitals, patients with acute cholecystitis are treated conservatively until the acute process has subsided. In another division of the Department of Surgery of the University of Minnesota the Minneapolis General Hospital Zierold (115) has practiced early operation with satisfactory results.

While the problem relating to the proper method of treatment cannot be settled definitely at this time it appears that the evidence at hand

favours the conservative plan of therapy as being safer than early operative interference.

SUMMARY

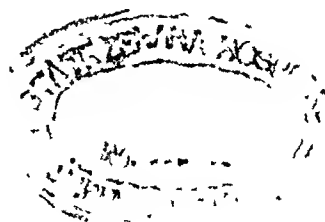
During the past few years a number of surgeons have advocated early operation in cases of acute cholecystitis. Many others, however, have condemned such a procedure as being more dangerous than the conservative policy of allowing the acute process to subside before operative interference is undertaken. The problem cannot be settled at this time.

Both types of treatment have been reviewed and the method of conservative therapy which is used at the University of Minnesota Hospitals has been outlined.

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ABDOMINAL WALL AND PERITONEUM

Iagnov Z, and Timus Gr Transmesenteric Hernias A Contribution to the Pathogenesis of Ruptures of the Mesentery (Les hernies trans-mésentériques Contribution à la pathogénie des brèches du mésentère) *J de chir* 1937 50 203

The authors state that a total of 41 cases of transmesenteric hernias were assembled by Prutz in 1907 Since that date they have added to the statistics of Prutz 14 other observations gathered from the periodicals and including their own 2 cases

The most frequent site of these hernias is at the level of the root of the mesentery near the ileocecal junction The next greatest number are situated at the center of the mesentery and the least number are found at the intestinal border The form or outline of the hernial gap may be round, oval or semilunar The size of these gaps has been found to vary from a few centimeters in diameter to the limit of the mesentery There were 2 cases which presented two mesenteric gaps each

The axis of the hernia in respect to the axis of the mesentery was found to be transverse at the root of the mesentery and vertical at the center of the mesentery This may be explained by the mechanical factor of two parallel arteries enclosing a mesenteric gap under tension The authors cite 5 definite cases from the literature in which this phenomenon has been the exciting cause The hernias at the base of the mesentery of the intestine do not limit themselves to any one axis

Etiologically gaps in the mesentery may be congenital traumatic or inflammatory

The congenital origin is almost universally accepted as the cause in the greatest number of cases Embryologically the mesentery is subject to a series of displacements and arrives subsequently at the final site In this complicated process a portion of it may fail to be united to the posterior abdominal wall or the peritoneum may become absorbed in the avascular area of Treves which is among the terminal arcades of the ileocecal artery Apparently 43 cases of the series of 55 were congenital in origin

The formation of the gap when caused by trauma is explained on the basis of a laceration of the mesentery with traumatic destruction of some vessels and subsequent absorption of the mesentery due to lack of nutrition Among the total of 55 cases presented the histories of 5 gave evidence of a traumatic origin

The inflammatory origin suggests that an inflammatory process produced in the mesentery later causes atrophy because of thrombosis of the veins Two definite examples of this process are found in the series

The authors are of the opinion that mesenteric gaps may be due to two consecutive anatomical phenomena It may be the result of an abnormal fibrous arcade through which a normally or abnormally placed duodenum passes, which becomes

enlarged by the normal variation in volume of the duodenum as the latter exerts traction and tension on the mesenteric base Or it may be caused by the absorption of the serous peritoneum caused by obstruction of the circulation from traction and tension of an active duodenum

The authors add the following report of 2 cases of transmesenteric hernias to the literature

The first case was that of a man aged fifty six years with no previous history of trauma, sickness or operations with the exception of an acute upper abdominal attack two years previous The findings at operation presented a fibrous arcade at the root of the mesentery which extended from the ileocecal region to the duodenojejunal flexure A large part of the small intestine had passed through this hernial opening and was found strangulated The hernia was reduced and the abdomen closed The patient died a few hours later

The second case was also that of a man He was forty nine years old and presented an acute condition of the abdomen with no previous history of trauma, sickness or operation At operation a large portion of the small intestine was found strangulated after it had passed through a hernial opening approximately 8 cm in diameter at the insertion of the mesentery in the ileocecal region The herniated strangulated intestines were reduced the hernial opening sutured and the abdomen closed The patient died twenty four hours later

The authors conclude that hernial openings in the mesentery through which transmesenteric hernias pass are based on a congenital traumatic or inflammatory origin Congenital formation of hernial openings is by far the most frequent it occurs in 81 per cent of the cases This type of hernia is due to failure of fixation of the mesentery to the posterior abdominal wall following embryological rotation It may also be due to absorption of the mesentery in the avascular area of Treves, caused or abetted by the mechanical factors of tension and traction on the blood supply of that area

Trauma was responsible for 9 per cent of the hernial openings made in this series This type of hernia is believed to be due to obliteration of the blood supply to that area of the mesentery with subsequent absorption of the mesentery and formation of the hernial opening

Inflammatory causes were responsible for mesenteric hernial openings in 1 per cent of the series These hernias were caused by inflammation which was followed by obliteration of the venous blood supply and subsequent absorption of the mesentery and formation of the hernial openings

RICHARD J BENNETT JR MD

Harris F I and White A S Failures Recurrences and Complications in Injection Treatment of Hernia *Am J Surg* 1937 37 203

The authors review the principles upon which the injection treatment of hernia is based They emphasize the importance of accurate knowledge of the

anatomy of the inguinal region and the importance of making a correct differential diagnosis of direct and indirect hernia. They discuss the choice of a proper truss and the technique of injection. The types of solution recommended are alcoholic solutions of tannic acid and solutions containing salts of fatty acids. These solutions are relatively non-irritating, do not produce a severe inflammatory reaction, and experimentally have proved to produce fibrous tissue and to be non-toxic to the subject.

In indirect inguinal hernia the authors recommend first injecting around the internal ring with four or five injections, then closing the inguinal canal, and lastly injecting the external ring. In the direct inguinal hernia Hesselbach's triangle and the external ring are adequately injected first, and the last injection is given about the internal ring. The number of injections varies from 8 to 12, and they are given as often as three times weekly on alternate days. The authors stress the importance of over-treatment rather than under-treatment to reinforce the treated area, especially in older patients or in patients with poor fibroblastic response. The follow-up period of examination extends over a year and examinations should be made at monthly intervals.

The authors report 225 cases of reducible direct and indirect inguinal hernias treated by the injection method from 1934 to September, 1936. The total number of injections was over 4,500. They divide their cases into (1) the operative group or that group which would ordinarily be considered good operative risks, and (2) the non-operative group, those which for some reason are poor surgical risks. In the first group there was a recurrence rate of 4.1 per cent, which compared quite favorably with operative statistics. In the second group there was a recurrence rate of 19.5 per cent.

The most common complication noted was transient swelling of the penis, scrotum, or inguino-abdominal region, which occurred in 90 per cent of the cases. Swelling of the cord occurred in 16 per cent, excoriation of the skin under the truss in 7 per cent, and hydrocele of the cord in 1.3 per cent. There were no cases of atrophy of the testis, impotence, abscess, or peritonitis. There were no deaths.

An analysis of the results in this series to date serves to illustrate two essential facts that the method is of value, and that it involves extreme care on the part of the surgeon if good results are to be expected. A recurrence rate of 4.1 per cent in patients who are good operative risks is encouraging. The fact that a favorable prognosis can be offered to 80 per cent of the patients in the inoperable group is most satisfactory. Even in those cases in which the condition recurs, further treatment can be instituted following elimination of the cause of recurrence. Furthermore, such hernias as recurred were much smaller in size than the original hernia and were more easily controlled by a truss. While there were a number of complications, they were all of a minor nature.

LOUIS SPERLING, M.D.

GASTRO-INTESTINAL TRACT

Arens, R. A., and Mesirow, S. D.: Gastric Mucosal Relief: A Modified Sedimentation Method, Using a Colloidally Suspended Barium Sulphate: A Preliminary Note. *Radiology*, 1937, 29, 1.

There has been a recent revival of interest in this country in the demonstration of mucosal patterns in the stomach and duodenum as an aid in establishing the normal and abnormal in gastric and duodenal diagnosis. The authors report a modification of the sedimentation method which represents a slight departure from the methods employed in the past. They used "rugar," a colloidally suspended barium, freely miscible with water and milk.

A series of 30 gastric examinations were presented, together with case reports of the typically normal, and several of the unusual abnormal, cases. The writers are in complete agreement with the Cole collaborators that the sedimentation method cannot be used as a routine method to the exclusion of the regular barium meal. It must be employed as an adjunctive examination in special cases because the resultant films are not as constant in depicting gastric abnormalities as those following the standardized meal. The sedimentation method may, in cases presenting puzzling features, add considerably to the present armamentarium. For lesions to be demonstrated in the cardia, the sedimentation method with partial gas distension is excellent, as it outlines tumor masses or abnormalities in the same manner that the pneumocolon reveals lesions in the colon.

It is hoped that the method outlined will form a basis for further study of the sedimentation method as a means of demonstration of the mucosal relief of the stomach.

JOHN W. NUZUM, M.D.

Gutmann, R. A., Senèque, J., Bertrand, I., and Beaugeard, G.: Beginning Cancer of the Stomach; Radiographic Diagnosis with the Magnifying Glass (Cancer de l'estomac au début. Diagnostic radiographique fait à la loupe). *Bull. et mém. Soc. méd. d'hôp. de Par.*, 1937, 53, 1039.

Gutmann and his associates present a case illustrating their method of diagnosis of cancer of the stomach in its very early stages. The patient was a man sixty-five years of age who had had only very slight gastric disturbances until six months ago. At that time he had suffered from epigastric pain radiating to the back and to the hypochondrium, occurring about two hours after meals and lasting from an hour and a half to two hours. There had been no vomiting, but frequent regurgitations with an acid taste had occurred. These attacks occurred daily for a month, then ceased entirely for nearly five months, and had recurred only eight days before the patient came to the hospital. All the plates of roentgenograms taken in a series showed a small depression 12 mm. long in the prepyloric region, at the middle of which was a shallow niche. This was so small that it could be seen clearly only with a magnifying glass. Treatment with intravenous injections of vegetable



Fig 1 View of one of the roentgenograms of the first series in natural size showing the picture found in all the roentgenograms in the first and second series the details are clearly shown only with a magnifying glass



Fig 2 Schematic illustration on the same scale of the defect (shallow niche in a depression)



Fig 3 Roentgenogram enlarged and retouched showing the details of the defect

proteins was carried out for three weeks this relieved the pain but had no effect on the roentgenological picture. The authors have found that when such a roentgenological picture is due to ulcer the treatment described results in its complete disappearance hence they concluded that the roentgenological findings in this case indicated a cancer in a very early stage.

At operation the stomach appeared normal until it was opened when a small erosion to which a white exudate adhered was found in the prepyloric region. A gastrectomy was done. This erosion which was visible proved to be only incidental to the actual lesion which was not visible to the surgeon.

Histological examination showed typical epitheliomatous changes in the mucosa and its glands and slight invasion of the muscularis mucosae. The submucosa showed no neoplastic changes but some inflammatory reaction.

In such a case even exploratory laparotomy would not have established the diagnosis as the outer surface of the stomach showed no pathological changes. Only the characteristic changes in the roentgenogram even though of slight extent indicated the correct diagnosis.

ALICE M. MEYERS

Newburger B. Gastric Operations for Benign and Malignant Conditions. *Ann Surg* 1937 106: 200

This title is somewhat confusing because the material studied included not only cases of gastric ulcer and carcinoma but also of duodenal ulceration. One hundred and thirty seven cases were operated on at the Jewish Hospital in Cincinnati from 1924 to 1934.

In the 50 cases of gastric carcinoma 18 were suitable and 32 were not suitable for resection. The gross mortality for surgery of gastric carcinoma was 46 per cent. For the 18 patients treated by resection the mortality was 44 per cent, for 16 patients treated by gastro-enterostomy it was 50 per cent, and for 15 undergoing simple exploratory laparotomy it was 47.3 per cent. Fifty five per cent of the cases permitting and 83 per cent of those not permitting resection developed some complication secondary to the operative procedure. Peritonitis was responsible for 63 per cent of the deaths, secondary hemorrhage for 12.5 per cent and pulmonary embolism for 13.5 per cent. In the non resectable group death from peritonitis occurred in 6 per cent, from pulmonary complications in 33 per cent, from secondary hemorrhage in 13 per cent, from cachexia in 13 per cent and from a vicious circle in 6 per cent. Two patients treated by resection are now alive. Slightly more than 10 per cent of the patients treated by resection were alive and free from recurrence at the end of the three years. There were 4 patients with gastric sarcoma 3 of which are alive one four and eight years respectively following operation. The fourth patient developed a recurrence in a year and died one and a half years following operation.

Gastric and duodenal ulcers are considered as entities. There were 71 ulcers 18 of which perforated freely into the abdomen and 53 of which were non perforating. Only 1 of the perforations occurred in a female. Fourteen of these 18 patients were treated by suture occasionally reinforced by omental tags. Three cases of perforation were not sutured and in these simple peritoneal drainage was employed only 1 of these patients died. In 1 case of primary closure of the perforation a gastro-enterostomy was added to the suture. The mortality for this group of patients was 33.3 per cent. There was only 1 death among the patients operated upon within six hours of the perforation. Peritonitis was responsible for 4 (66 per cent) of the fatalities. duo

denal fistula for 1, and separation of the wound for 1. Five, or 55 per cent of the 9 patients followed-up were symptom-free, 1 had mild dyspepsia. Of 2 patients surviving the perforation, 1 treated by resection is completely well and the other treated by excision and gastro-enterostomy now has a jejunal ulcer.

There were 53 patients with non-perforating gastric and duodenal ulcer. Fifty indirect operations were performed, 48 gastro-enterostomies, 1 excision of an ulcer, and 1 cauterization of an ulcer. In the group with duodenal ulcer only gastro-enterostomy was used. The mortality for the combined groups was 13.2 per cent, that for the group with gastric ulcer 22.2 per cent, and with duodenal ulcer, 3.8 per cent. Following gastro-enterostomy the total mortality was 8.3 per cent, or 3.8 per cent for the duodenal and 13.6 per cent for the gastric ulcers.

Of the 28 non-perforated ulcers traced, 43 per cent were asymptomatic and 46.9 per cent resulted in definite failure. Therefore almost 50 per cent of the cases resulted in failure, which the author found was "independent of whether the pathological condition at the time of the operation was severe or mild."

It is of interest to note that of the 31 gastro-enterostomies performed for benign lesions 48.3 per cent were followed by jejunal ulcers, and the author concludes, "Because of the extreme frequency of jejunal ulcer, gastro-enterostomy should be discarded as a method of treatment for gastroduodenal ulcer except for a small strictly selected group. Resection and resection for exclusion should be the methods of choice."

This report contains, in addition to the author's statistics, an extremely valuable compilation of data by means of which the author contrasts his results with those of surgeons and clinicians interested in this subject. SAMUEL J. FOGELSON, M.D.

Bertrand, P., Etienne-Martin, M., and Corajod, E.: Exteriorization of the Large Intestine (*L'exteriorisation du gros intestin*) *Lyon chir.*, 1937, 34, 406.

Bertrand and his associates note that by exteriorization is meant not only bringing a mobile or mobilized segment of the intestine outside of the body, but also closing the peritoneum beneath it so that the segment is isolated from the peritoneal cavity.

There are several techniques for this procedure, but they may be grouped under three types:

1. Exteriorization and immediate resection with partial re-establishment of the intestinal continuity. This is the method of Volmann-Bouilly.

2. Exteriorization and immediate resection without partial re-establishment of the intestinal continuity. This is the method of both Paul and Hartmann.

3. Exteriorization and resection later, in six or eight days. This method is used by Bloch and Quenu, and also by Mikulicz, but Mikulicz has recently employed a method of immediate resection.

The authors report experiments on dogs in which various methods of intestinal exteriorization were used. With the first technique of exteriorization, the peritoneum was sutured around the exteriorized segment and at both ends of the incision but the mesentery was not fixed. Immediate resection was done and an artificial anus with two openings was made. The second technique included immediate resection with fixation of the mesentery to the parietal peritoneum and the use of a Paul tube in the upper segment. With the third technique, the base of each segment of the loop was fixed by a single suture, resection was done three to five days later. In another group of animals the loop of intestine was exteriorized without fixation of the loop or of the mesentery, but the intestine was not resected. The only deaths that occurred were in the group of animals operated on by the first method.

From these results the authors conclude that if the intestine is to be resected immediately, the fixation of the mesentery should be done to avoid too rapid retraction of the upper segment with the danger of soiling the peritoneal cavity. If a secondary resection is done, sufficient coalescence has been established between the parietal peritoneum and the mesentery of the exteriorized loop to prevent this retraction. When a loop of the intestine was simply exteriorized on compresses without suture of the peritoneum and without fixation of the loop or its mesentery, it was spontaneously drawn back into the peritoneal cavity in about twenty days. While secondary resection is done best eight to twelve days after exteriorization, it is not always possible as the exteriorized loop may show gangrenous changes and require resection by the third or fourth day.

If the method of exteriorization of an intestinal loop is to give good results with no or very low mortality, certain principles must be observed. In the first place, the operation should be attempted only when the lesion is in a mobile or easily mobilized portion of the large intestine. A sufficiently large section must be exteriorized to expose the lesion fully, and in the case of cancer, the lymphatics. Retraction of the loop and its mesentery must be prevented by section of, and later by fixation of, the mesentery. Preparation must be made for the ultimate closure of the artificial anus. When possible, the authors advocate that the two sections of the loop be brought together side to side after resection and the posterior portions sutured.

This operation of exteriorization of a loop of the intestine may be employed in certain surgical emergencies, such as injury to the intestine or its mesentery, perforations due to dysentery or other acute infection, and acute obstruction, especially volvulus or invagination. However, these lesions must involve a mobile or easily mobilized segment of the intestine, and especially the sigmoid flexure. In chronic conditions, the operation is indicated in megacolon, chronic sigmoiditis, and cancer of the transverse colon or sigmoid flexure, especially the latter.

ALICE M. MEYERS.



Drawings illustrating Forssner's classification of intrinsic duodenal malformations

Krieg E G Duodenal Diaphragm *Ann Surg* 1937 106 33

The author discusses intrinsic malformations of the duodenum due to diaphragmatic lesions. Twenty cases have been reported in the literature to which one is added (See figures above).

A clinical differentiation between duodenal diaphragm and areas of stenosis and atresia cannot be made in the first weeks of life because the clinical pictures may be identical. Later a more definite diagnosis can be made. At all ages x ray studies and the clinical findings. In the correction of these lesions certain technical considerations improve the result obtained.

Diaphragmatic obstructions may be encountered throughout life. The earliest age reported was that of a still born infant and the oldest seventy. In contrast the patients with stenosis rarely live more than four weeks. Clinically the symptoms of the condition are those of pyloric obstruction and they may be acute or chronic. Pain in the upper quadrant is present in most cases. Constipation is present in varying degree. Visible peristalsis is present in 25 per cent of the cases. The treatment is surgical. Duodenojejunostomy is preferable to gastrojejunostomy. Non absorbable sutures are advisable.

The lesion cannot be detected without opening the lumen of the gut. The only clue to its presence is a dilated proximal segment. SAMUEL KAHN M.D.

Garry G Duodenitis and Its Surgical Treatment *Lancet* 1937 232 1512

Duodenitis must be differentiated from duodenal ulcer, gall bladder disease, pancreatitis, appendicitis and colitis. In 1934 Kirklind described an x ray examination which may show pathognomonic findings.

The series of cases reported comprised 20 of simple duodenitis verified by operation and by microscopic examination of excised tissues. The diagnosis was not made pre-operatively in any of the cases. Thirteen were diagnosed erroneously as duodenal ulcer and the remainder as gall bladder disease, appendicitis and colitis.

In discussing the surgical treatment emphasis should be placed upon the fact that duodenitis is essentially a medical condition and surgery is utilized only in those cases in which medical measures have been of no avail. The author's experience with

gastroenterostomy has been unsatisfactory. This operation was done in 13 cases with good results in only 3. Five are described in detail.

In the discussion emphasis is placed upon the similarity of microscopic findings in duodenitis to those found in appendicitis. In both conditions the mucosa is only lightly affected while the intensity of the process is confined largely to the muscular coats. The intensity of the process is largely confined to the muscular coats and varies from a very moderate degree to a very intense degree in which there is almost a phlegmonous inflammation of the duodenal muscularis.

The cases reported show the disproportion between the symptoms and the anatomical findings. The severest clinical manifestations are often found in conjunction with insignificant operative findings. Under these circumstances the surgeon finds himself in a predicament about the correct diagnosis and the proper procedure to follow. It is important therefore to establish as far as possible an accurate diagnosis pre-operatively. Once the diagnosis of duodenitis is established, the only recourse left for obstinate cases refusing all internal therapy is operation. It appears to the author that gastroduodenal resection should be the method of choice.

SAMUEL J FOGELSON M.D.

Hoffman W J and Pack G T Cancer of the Duodenum. A Clinical and Roentgenographic Study of 18 Cases *Arch Surg* 1937 35 11

This paper presents a clinical and roentgenographic study of 18 cases of primary carcinoma of the duodenum collected from the material of the New York Hospitals. In 5 of the cases the patient was studied during life by the authors. All were instances of true carcinoma of the duodenal mucosa. Cases of carcinoma of the ampulla or of the papilla of Vater are not included.

The rarity of primary carcinoma is indicated by its incidence of 0.033 per cent in 350,286 autopsies. The sex incidence shows a preponderance of males of 3 to 1.

The usual pathological type is some form of adenocarcinoma arising from the duodenal mucosa. The gross forms may be scirrhous, bulky and polypoid or colloid. The pathological findings in these 18 cases are summarized.

The symptoms of duodenal carcinoma are chiefly those due to obstruction of the duodenum and neighboring structures. The early stages are featured by anorexia, gaseous eructations, epigastric distention, and nausea. As obstruction develops, these become more severe, and pain, vomiting, dehydration, loss of weight, and constipation quickly follow. A palpable tumor is found in more than half the cases. The sloughing away of portions of the tumor may temporarily relieve the obstruction or give rise to severe hemorrhage. When the bile passages are obstructed, jaundice of a constant, unremitting type develops. The progress of the disease is swift, and the loss of weight may be extreme.

The average duration of life is about seven months after the onset of symptoms. The shortest duration of life is found in cases in which the lesion is around the ampulla; the longest duration, in those in which the lesion is in the first portion of the duodenum.

In almost every case of duodenal carcinoma which is studied roentgenographically definite pathological changes can be demonstrated. Such evidence was present on the films in 15 cases in which such studies were made. In 14 of these the pathological process was recognized and described. In only 1 instance, however, was the possibility of a primary carcinoma of the duodenum suggested. The various roentgenographic findings are described at length.

The diagnosis and differential diagnosis are discussed in detail.

The treatment of primary carcinoma of the duodenum is preeminently surgical. The operative mortality is high. It amounted to 58.3 per cent in the authors' series of cases. In a large percentage of cases at operation there is no evidence of metastasis or local extension of the disease. The surgical removal of all of the malignant tissue might therefore often be feasible if this mortality could be brought down to a reasonable level by efforts to combat the effects of the intestinal and biliary obstruction prior to operation. The patients show advanced degrees of starvation, dehydration, alkalosis, anemia, jaundice, and gastric distention. Measures recommended in the preparation of the patient for operation are the restoration of body fluids, mineral salts, carbohydrates, and blood supply. Various surgical procedures which have been employed are described, discussed, and illustrated. The operative results obtained in the various procedures employed in 12 of this series of 18 cases are described and summarized.

LOUIS SPERLING, M.D.

Stewart, H. L., and Lieber, M. M.: Carcinoma of the Suprapapillary Portion of the Duodenum. *Arch Surg*, 1937, 35, 99.

Stewart and Lieber report 6 cases of carcinoma of the suprapapillary segment of the duodenum and analyze the data obtained from the reported cases of this condition in the literature. A clinical and pathological correlation was based on their 6 patients together with 35 cases reported in the literature. Reference was made to 68 additional cases recorded

as examples of this condition. Twenty-four patients were men and 15 were women. Their average age was 55.75 years.

The onset was acute in about half of the patients and gradual in the others. A previous history of symptoms referable to the upper half of the abdomen was elicited in approximately half of the cases. The acute symptoms consisted of vomiting, epigastric pains, weakness, loss of weight, and jaundice. The average duration of life was three and one-half months. In patients with a gradual onset of symptoms, the average duration of life was sixteen months. In 24 per cent of the patients a mass was palpated in the region of the primary tumor. The gastric or duodenal contents contained blood in 8 of 13 cases, free hydrochloric acid in 7, and bile in only 1 patient with cholecystogastrostomy. Blood was found in the stools in 13 of 21 patients. A marked grade of anemia was present in 10 patients.

Roentgenographic studies were of little value in making a positive diagnosis of carcinoma of the suprapapillary portion of the duodenum. In a few instances an ulcerated lesion in the duodenum or an obstruction of the gastro-intestinal tract was suggested. Extensive constricting lesions were not often demonstrated. The findings were most frequently interpreted as pyloric obstruction. The x-ray was of great value in ruling out lesions of the stomach, colon, or gall bladder.

A correct pre-operative diagnosis of carcinoma of the suprapapillary portion of the duodenum was made in only 2 instances. A correct surgical diagnosis was made in 9 of 19 cases. No instance of cure of this condition has been recorded in the literature. The growth averaged 2.5 cm. in length in about half of the cases and varied from 4.5 to 8 cm. in about 31 per cent. Ulceration occurred in 73 per cent of the cases and in about half of these there were annular or constricting lesions. Metastases were present in 75.6 per cent of all the cases, in the liver, pancreas, lymph nodes, biliary passages, peritoneum, lungs, and bones. All of the growths but one were adenocarcinomas; the exception was an adenosquamous carcinoma.

JOHN W. NUZZUM, M.D.

Klages, F.: Acute Inflammation of an Isolated Diverticulum of the Cecum with the Picture of Appendiceal Inflammation (Akute Entzündung eines isolierten Blinddarmdivertikels unter dem Bilde der Wurmfortsatzentzündung). *Zentralbl. f. Chir.*, 1937, p. 1090.

The author reports a case of isolated diverticulum of the cecum with acute inflammation.

At operation an inflammatory tumor of the size of a small apple was discovered 3 cm. above the appendix on the convexity of the large intestine at the site of a tenia libera, which was removed together with a portion of the diseased colonic wall and the appendix by means of an oval resection. The colon was sutured. No further diverticula were found anywhere in the intestines. Perfect recovery followed. Study of the resected specimen disclosed an inflam-

matory tumor of the intestinal wall which had developed directly alongside a tenia from a diverticulum containing a fecolith of the size of a bean. The wall of the diverticulum was markedly inflamed but nevertheless a margin of the intestinal wall along with the appendix itself was entirely free of inflammatory changes. The wall of the diverticulum everywhere disclosed remnants of musculature arranged in transverse and longitudinal fibers. The mucosal lining of the diverticulum was completely broken through by the inflammatory changes at two oppositely situated areas. The changes in the upper portion appeared to be the older and those in the lower wall appeared in general to correspond to the primary inflammatory complex of appendicitis.

Such a protrusion of the wall of the cecum is rare. The histological picture of a good delineation of all layers of the intestinal wall somewhat poorly developed and dissociated it is true repeated in the wall of the diverticulum permits the protrusion to be designated a true diverticulum. The true diverticula in fact are situated mostly on the convexity of the colon and in the tenia while the false diverticula are found at the mes-enteral attachment. The cause of the acute inflammatory attacks in these intestinal wall protrusions probably lies in the effects of the foreign bodies such as fecoliths and intestinal parasites contained in the intestines when subjected to external injurious forces or when touching the walls of the diverticulum as a mere hernial content or in an infection following a specific intestinal ailment. However the fecolith appears not to be solely responsible for the acute onset and course of the inflammatory phenomena. This can be ascertained from a consideration of the histological findings. On the upper part of the wall of the diverticulum the mucosal layer is interrupted and here is seen at the point of mucosal destruction, a zone of granulation tissue consisting of old connective tissue which now however because of the phlegmonous changes in the walls is diffusely infiltrated by leucocytes. At any rate the ulceration of the mucosa at this point must have been of longer duration than the stormy clinical symptoms of only two days duration. The findings of the locus at the lower pole of the diverticulum are entirely different, here there is everywhere the acute picture of pus, blood and fibrin corresponding to the clinical symptoms. The chronic inflammatory changes in the walls of the diverticulum result from the fecal stasis and the mechanically injuring effects of the fecal concretion. With the appearance of some other infective process in the body such as tonsillitis this damaged spot in the intestinal wall is concurrently involved either via the blood stream or from an infection directly from the lumen of the intestine with intestinal bacteria. The wall of the colon which is involved in diverticulum formation presents an area of lowered resistance in the presence of other infective processes in the body and therefore frequently plays a part in these cases in the form of an

acute inflammatory involvement of the intestinal wall. Likewise in other cases of diverticulum for instance in the sigmoid the diverticulitis may become complicated by an acute infection of the damaged portion of the bowel and its connection with for example suppurative phlebitis be obvious (ERICH HEMPEL) JOHN W. BRYNAN M.D.

Anal G. W. Venereal Diseases of the Anus and Rectum *Am J Syphilis* 193, 21 430

Five venereal diseases are known to invade the anus and rectum. The ones discussed include syphilis gonorrhea chancroid granuloma inguinale and lymphopathia venerea or lymphogranuloma inguinale. The present status of the fourth venereal disease or the genital infection by Vincent's organisms with or without agranulocytosis is unsettled and herein omitted. The same uncertainty exists regarding Lipschutz' ulcer vulvae acutum, which also is not discussed.

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There are commonly three stages of early secondary syphilis of the anus and rectum ulceration dermatitis and condyloma. Contact infection of the approximated surfaces of the buttocks and perineum may take place resulting in a conglomerate picture of multiple perianal fissuring ulcerations rhagades and condylomatous growths.

Any suspected open lesion requires the exercise of great caution on the part of physicians and their assistants because of the hazard of infection. In the presence of an anal ulcer a dark field examination is indicated before any type of therapy is instituted. A negative dark field does not eliminate the spirocheta pallida as the causative agent. One may have to wait for the development of secondary lesions or the appearance of positive serology. When the diagnosis is established the routine treatment of syphilis is indicated. For the early primary lesions a bismuth and mercury dusting powder may be useful. For the conglomerate early secondary lesions local cleanliness and compresses of a 1:2000 solution of bichloride of mercury are indicated. The dusting powder may also be used.

Later manifestations of syphilitic involvement of the anus and rectum are bizarre and rare. The belief that stricture of the rectum is due to syphilis in a large majority of cases is rapidly disappearing. The rôle of lymphopathia venerea in the production of rectal stricture is now recognized. However many patients with rectal stricture have or have had

syphilis. True syphilitic stricture of the rectum should show definite response to antisymphilitic therapy before many injections have been given. Treatment should not be continued indefinitely in the absence of improvement, since in these cases the stricture is probably due to lymphopathia venerea or some other cause.

The question of early or late syphilitic ulceration of the rectum is sometimes raised when ulcerative lesions of the rectum and pelvic colon are encountered. The bulk of the evidence indicates that while there are many good pictures and descriptions of syphilitic ulceration of the rectum, there are few proved cases. Late multiple fissuring and rhagades have been reported. Gummatous lesions of the anus and rectum are encountered more commonly than stricture and ulcer. They develop into nodular hard or soft tumors that do not tend to suppurate. The general physical examination together with serological examination usually establishes the diagnosis.

The gummatous lesion may also be encountered as an irregular spongy mass in the hollow of the sacrum, frequently encroaching on the lumen, of the rectum which may cause it to be confused with one of the congenital tumor masses of the region. It may develop in the ischio-rectal fossa and be incised mistakenly for abscess. In the region of the rectosigmoid a diffuse irregular gummatous lesion may be confused easily with malignancy, diverticulitis, or some other granulomatous disease such as actinomycosis, amebic granuloma, or lymphopathia venerea. It must be granted that malignancy may occur also in a patient with syphilis. Neurosyphilitic crises may occur in the anus and rectum. Lack of local evidence of disease may leave the proctologist at a loss to account for the severe pain experienced by these patients. A patulous atonic sphincter is often an early diagnostic aid.

Syphilis of the newborn commonly manifests itself about the anus. The other suggestive findings of syphilis are usually present. Erythema tending to have a bronze cast may be seen. Dermatitis, with fragile, brittle anal skin tending to shallow fissuring, occurs. Infants with superficial fissuring and ulceration about the anus should be treated symptomatically pending the arrival of the serological report.

In most cases of gonorrheal proctitis or anorectal infection there are such mild symptoms, consisting of moderate smarting, itching, and burning soreness about the anus, that the condition is overlooked. In the female, anorectal infection may follow closely upon genital infection or at any later time as long as there is a vaginal discharge. The relatively high incidence of anorectal gonorrhea in the female is pointed out. In the male the onset of symptoms usually follows within a week after direct inoculation. In either sex the infection may occur as a result of pederasty. A number of accidental infections have been reported by Stuehmer as a result of rectal examination without a change of gloves by the examiner. The majority of patients at some time or other show hyperemia in the lower 2 or 3 inches of

the rectum, this is most marked at the anorectal line in the region of the crypts. An infected abscessed crypt or anal fissure develops occasionally.

In making a diagnosis the crypts are identified through the anoscope, and their contents are milked upward by pressure with an applicator. One should make every effort to substantiate the diagnosis of gonorrhea by obtaining positive smears of the organism from the contents of the crypts.

Such complications as ulceration, abscess, and fistula may follow gonococcal infection of the crypts of Morgagni. The crypts act as reservoirs for the gonococcus and these structures constitute a nidus of gonococcal and focal infections in general. A chronic low grade cryptitis persisting for a few years may eventually develop into abscess, or incomplete or complete fistula. The rôle that gonorrhea, like syphilis, plays in stricture of the rectum is very uncertain in the light of recent investigations on lymphopathia venerea. The excellent work of Hayes shows that a large percentage of cases of rectal stricture give positive serology for syphilis and give a positive rectal smear for the gonococcus, yet clinically, they fall into the group known as lymphopathia venerea and give positive Frei tests.

The present treatment of gonorrhea of the anorectum depends on the individual case. Many patients do not present any rectal complaint, which indicates that the disease is usually self-limited and tends to spontaneous recovery. The regimen should include a bland diet and the use of hot sitz baths. Instillations of a 5 per cent mild silver protein are advocated by Martin. The remote disability in the form of suppurative processes, arthritis, or other complications constitutes a valid reason for the surgical removal of the crypt infection or fistula following the active stage of a gonorrheal proctitis.

The appearance of chancroidal infection of the anus and rectum in the careless, perverted, or unhygienic individual is reported occasionally and it constitutes the rare venereal infection. The streptobacillus of Ducrey is extremely difficult to isolate from the chancroid. A specific intradermal skin reaction has been developed, and it is positive by the eighth day of the infection and persists for life. This highly infectious venereal infection transmitted to either sex by pederasty is accompanied by painful irregular ulcers and by a rapidly spreading phagedenic lesion. Auto-inoculation of approximating surfaces tends to spread the disease locally. The ulceration must be differentiated from early syphilis. The pain and tenderness is more severe than in chancre. In late cases there is usually considerable destruction of tissue and this destruction rarely extends above the anorectal line.

Harsh local treatment with caustics or escharotics is contra-indicated. The intravenous administration of increasing doses of tartar emetic has given good results. Intravenous mercurials combined with local cleanliness have given excellent results. A specific serum has been developed in Europe but is not yet available here.

matory tumor of the intestinal wall which had developed directly alongside a tumor from a diverticulum containing a fecolith of the size of a bean. The wall of the diverticulum was markedly inflamed but nevertheless a margin of the intestinal wall along with the appendix itself was entirely free of inflammatory changes. The wall of the diverticulum everywhere disclosed remnants of musculature arranged in transverse and longitudinal fibers. The mucosal lining of the diverticulum was completely broken through by the inflammatory changes at two oppositely situated areas the changes in the upper portion appeared to be the older and those in the lower wall appeared in general to correspond to the primary inflammatory complex of appendicitis.

Such a protrusion of the wall of the cecum is rare. The histological picture of a good delineation of all layers of the intestinal wall somewhat poorly developed and dissociated it is true repeated in the wall of the diverticulum permits the protrusion to be designated a true diverticulum. The true diverticula in fact, are situated mostly on the convexity of the colon and in the teniae while the false diverticula are found at the mesenteric attachment. The cause of the acute inflammatory attacks in these intestinal wall protrusions probably lies in the effects of the foreign bodies such as fecoliths and intestinal parasites contained in the intestines when subjected to external injurious forces or when touching the walls of the diverticulum as a mere hernial content or in an infection following a specific intestinal ailment. However the fecolith appears not to be solely responsible for the acute onset and course of the inflammatory phenomena. This can be ascertained from a consideration of the histological findings. On the upper part of the wall of the diverticulum the mucosal layer is interrupted and here is seen at the point of mucosal destruction a zone of granulation tissue consisting of old connective tissue which now however because of the phlegmonous changes in the walls is diffusely infiltrated by leucocytes. At any rate the ulceration of the mucosa at this point must have been of longer duration than the stormy clinical symptoms of only two days duration. The findings of the focus at the lower pole of the diverticulum are entirely different here there is everywhere the acute picture of pus blood and fibrin corresponding to the clinical symptoms. The chronic inflammatory changes in the walls of the diverticulum result from the fecal stasis and the mechanically injuring effects of the fecal concretion. With the appearance of some other infective process in the body such as tonsillitis this damaged spot in the intestinal wall is concurrently involved either via the blood stream or from an infection directly from the lumen of the intestine with intestinal bacteria. The wall of the colon which is involved in diverticulum formation presents an area of lowered resistance in the presence of other infective processes in the body and therefore frequently plays a part in these cases in the form of an

acute inflammatory involvement of the intestinal wall. Likewise in other cases of diverticulum for instance in the sigmoid the diverticulitis may become complicated by an acute infection of the damaged portion of the bowel and its connection with for example suppurative phlebitis be obvious (ERICH HEMPLE) JOHN W. BARNAN MD

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In the fourth case, that of a child who had abdominal pain and vomited, the gall bladder was enlarged. Examination of the gall bladder after removal showed a normal epithelium for the most part and just beneath it a hemorrhagic infiltration involving the chorion of the mucosa and the sub-mucosa; in a few areas the epithelium was broken down. There was no evidence of infection or of calculus.

The authors conclude that such hemorrhagic lesions in the gall bladder are due to rupture of either superficial capillaries or deeper arterial vessels. These occurrences are rare, but it is evident that the blood vessels of the gall bladder may be broken down as a result of stasis or irritation. In none of the authors' cases was there evidence of infection. Clinically such hemorrhagic lesions of the gall bladder resemble acute cholecystitis with or without calculus, they are distinguished by the unusual severity of the acute attack with symptoms of peritoneal reaction and the unusual hardness of the gall bladder on palpation. ALICE M MEYERS

Finsterer, H.: Surgical Indications in Diseases of the Gall Bladder and Pancreas (*Chirurgische Indikationen bei Erkrankungen der gallenblase und des Pankreas*) *Wien med Wchnschr*, 1937, 1: 553

The author discusses the affections of the gall bladder and of the pancreas since the two are very frequently interrelated. The most frequent ailment of the gall bladder is lithiasis with accompanying cholecystitis. Gall-stone disease often pursues a totally latent course, never giving rise to surgical indications of any kind. Nevertheless, the author believes that any gall bladder containing stones should be removed when found during laparotomy for other reasons. It is not true that the operation of cholecystitis is dangerous, or that the definitive results are not better than those of medical treatment, as is asserted by internists, provided that the operation is not delayed to the point where life is actually endangered. The author gives proof of this. In advanced age the operation has a mortality of only 12 per cent and even when done during an acute attack the mortality is small. More important than these considerations is the condition in which the patient comes to operation. As regards the definitive results from 90 to 95 per cent of those operated upon are rendered completely and permanently able to carry on their work. Most of the failures are not due to the disease of the bile passages, but to an ulcer ventriculi or duodeni, and only exceptionally to a recurring cholangitis. Even in cases of stenosis of the choledochus, the percentage of cures has been raised to 95 per cent, since the use of choledochoduodenostomy in place of drainage of the hepatic duct. The best immediate results are afforded by the interval operation, in young people this operation is almost entirely without danger, and even in old age the results are not bad when the operation is done under local anesthesia. Cholecystitis in old people, which begins with high fever, affords the indication for emergency

surgery, since otherwise there is a tendency for the process to go on to gangrene of the gall bladder and perforation. The operation should not be cholecystostomy, but cholecystectomy. Perforative peritonitis or non-perforative biliary peritonitis affords an absolute indication for operation, however, the operation is usually done too late. The prognosis is even more grave when the pancreas is involved secondarily. As for the indications in the presence of stenosis of the choledochus, in the concurrent presence of total closure of the choledochus, fever, and chills the author recommends immediate operation. The mortality figures for closure of the choledochus are not yet satisfactory, in the author's experience the mortality has been about 10 per cent. This mortality may be considerably lowered by choledochoduodenostomy in the place of drainage of the liver. In the cases of chronic cholecystitis and in cholecystic stasis of the bile, cholecystectomy is indicated only if every other abdominal affection has been definitely excluded as the cause of the suffering. In carcinoma of the gall bladder results are poor, since generally the operation is done too late. For this reason one should prevent the development of carcinoma by timely removal of an inflamed, stone-infested gall bladder. In the treatment of acute pancreatitis in the last years, a complete change has taken place. According to Walzel, the mortality of early operation was 68 per cent and has been reduced to 28 per cent by conservative methods. Conservative treatment deserves preference if the diagnosis is certain. In cases of doubtful diagnosis an exploratory laparotomy may be recommended; however, in the presence of an acute pancreatitis the laparotomy should remain limited to an exploratory operation only. Chronic pancreatitis, which is often the result of cholelithiasis or a penetrating ulcer ventriculi or duodeni demands surgical treatment if it should cause stenosis of the choledochus, in such cases choledochoduodenostomy is the operation of choice. Of the tumors of the pancreas only the cystadenoma has any considerable significance, its treatment consists in the enucleation of the growth, which as a rule is well encapsulated. Carcinoma of the pancreas is only rarely amenable to radical surgery. Postoperative disease of the pancreas occurs following choledochoduodenostomy as a result of injuring the pancreas, or following the resection of an ulcer which has penetrated into the pancreas. Therefore, it is better when such ulcers are operated upon that the base of the ulcer be left *in situ* in the pancreas.

(MAXIMILIAN HIRSCH) JOHN W BRENNAN, M D

Wuestmann, O.: The Treatment of Acute Pancreatitis with Hormone from the Anterior Hypophyseal Lobe (*Zur Behandlung der akuten Bauchspeicheldruesenentzuendung mit Hypophysenvorderlappenhormon*) *61. Tag. d. deutsch Ges f. Chir.*, Berlin, 1937.

In 1935 Anselmino, Herold, and Hoffmann reported that they had obtained substances from the

At this time there is much confusion prevalent in the literature and elsewhere regarding the venereal granulomatous diseases of the anorectogenito inguinal region

Granuloma inguinale due to the Donovan body responds favorably to antimony compounds. It should not be confused with lymphopathia venerea which is considered due to a specific virus and is very resistant to any form of treatment now available. The diagnosis of granuloma inguinale rests upon the identification of the Donovan bodies in smears or sections from the lesion.

In granuloma inguinale the perineal process is characterized by marked destruction of the involved superficial tissues. When the process produces stenosis of the anus it does not produce rectal stricture; the stenosis ends abruptly at the anorectal line. This type of anal stricture is amenable to dilatation under anesthesia.

The name lymphopathia venerea was advocated by Sulzberger and Wise and Wolfe and Sulzberger in 1932 and seems to be a suitable term including all the manifestations of this disease. At least it would aid in separating it from granuloma inguinale.

Lymphopathia venerea described under the terms lymphogranulomatose inguinale subaigue lymphogranuloma inguinale and poradenitis is considered a contagious disease commonly acquired venereally, due to a specific virus and constituting an infection of nearly boundless pathological expressions. The Frei test is a specific intradermal method of examination for this disease.

In America this disease appears predominantly in the colored female. The female rarely develops any inguinal involvement and may be unaware of the early manifestations. The male commonly develops inguinal adenitis.

It is considered to have largely a lymphatic mode of invasion with marked destruction of tissues: rectal stricture, elephantiasis of the external genitals and frank destruction of the perineum. The rectum may appear as a rigid, moth-eaten tube which is irregularly contracted and shows areas of diaphragmatic stenosis. The greatest involvement is encountered within the first 3 or 4 inches of the rectum and frequently starts at the anorectal line. The diffuse fixation encountered in these irregular rigid lesions is resistant to the passage of the examining finger or instrument. Perforation of the diseased tissue occurs easily. Accompanying the disease are constitutional evidences of infection and as a result of the chronic sepsis recurrent fever, chronic blood loss, impaired digestion, cachexia and wasting debility result. Many of those who acquire this infection in early life die before the age of fifty years.

The present treatment of lymphopathia venerea is unsatisfactory in all respects. Colostomy may be of temporary value for the obstruction. Incision and drainage of abscess cavities are indicated, but fistulectomy, if it means a division of the sphincter, should not be performed.

JOHN E. KIRKPATRICK, M.D.

LIVER GALL BLADDER PANCREAS AND SPLEEN

White F W. The Galactose Tolerance and Urobilinogen Tests in the Differential Diagnosis of Painless Jaundice. *New England J Med* 1937; 216: 1017.

The urobilinogen and galactose tolerance tests of the urine were used in the study of 80 cases of painless jaundice. While the tests do not accurately measure liver function, they may be used to differentiate medical from surgical conditions.

On account of the variation in liver function at different periods of an attack of jaundice and because of some variation in the tests themselves, one test is of little value. A series of examinations beginning early if possible, and carried through the height of the jaundice for a week or two, is far more valuable.

Malignant obstruction persistently reveals absence of urobilinogen in the urine. This finding is in striking contrast to that in a case of silent stone in the common duct in which the excretion of urobilinogen steadily increased.

A positive galactose test in painless jaundice showing from 6 to 7 gm. is practically conclusive of liver degeneration. However, a negative result does not exclude liver cell injury. In this way, the combination of these two tests is useful in distinguishing acute and chronic, toxic and infectious hepatitis from painless obstruction outside of the liver.

In gall bladder disease the tests are not distinctive and the diagnosis must be made from other clinical data.

Valuable prognostic information can be obtained from these examinations by measuring the speed and degree of recovery of liver function after an attack of jaundice.

GEORGE A. COLLETT, M.D.

Flessinger N, Bergeret A and Laveul J. Hemorrhagic Gall Bladders (Les hémocholécystes). *Presse méd. Par* 1937; 45: 1019.

Flessinger and his associates report several cases showing that hemorrhagic lesions may develop in the gall bladder without infection and without neoplasm.

In the first 3 cases reported gall stones were present. There was a history of attacks of biliary colic with or without jaundice and with or without fever. The diagnosis of gall stones had been made. The last attack was of unusual severity accompanied by symptoms of a peritoneal reaction and vomiting. On palpation the gall bladder was large and unusually hard. In none of these cases was there any bleeding from the rectum. At operation the gall bladder was found to be greatly distended and of a violet color and to contain blood clots and blood. In a case, the hemorrhage was due to ulceration but to multiple hemorrhagic erosions. In the third case there was a large hematoma of the wall with a large ulceration at the site of the calculus.

GYNECOLOGY

UTERUS

Douay, E.: Diagnosis of Carcinoma of the Body of the Uterus. Information Gained from Hysterography (Diagnostic du cancer du corps utérin Renseignements donnés par l'hystérogaphie) *Gynécologie*, 1937, 36 413

It is not Douay's argument that hysterography, lipiodol and x-ray study of the uterus, should be a routine procedure in patients with carcinoma of the body of the uterus, but he does think that it is a valuable diagnostic aid in questionable cases, a definite aid in cases to be curetted, and of value in the general study of this lesion. He finds its greatest use in cases of persistent uterine bleeding without obvious cause. Unsuspected endometrial changes may be seen fluoroscopically while the lipiodol injection is being made, and roentgenograms may be taken in the anteroposterior and lateral positions for permanent record.

The technique is fairly simple. The cervix is grasped with a tenaculum and pulled upon so that there is as little flexion of the body of the uterus as possible. By means of a special syringe and a cannula a known amount of lipiodol, 3 to 5 c cm., is delivered into the uterine cavity under fluoroscopic visualization. The pressure used will have to depend upon the operator's judgment and the individual case. There is no particular harm in forcing the oil into the horns, in fact, by so doing, lesions may be discovered which would be missed by the curette. Even the gentle drop-by-drop flow of the oil into the tubes may disclose lesions causing the uterine hemorrhage, if no cause for it has been found in the body. Naturally, care must be taken not to force uterine or tubal contents into the peritoneal cavity, and the cannula must not be buried in soft, carcinomatous tissue where the oil may be injected directly into a vein. The uterus is observed fluoroscopically throughout the whole procedure. Roentgenograms are taken when 2 c cm. of oil have been injected, and again when the uterine cavity is full and under slight tension. A third picture is taken in the lateral position, and, upon withdrawing the sound, a fourth picture is taken as the fluid is evacuated. The whole process takes from five to ten minutes, and the patient need not be hospitalized.

Twelve interesting figures, illustrating hysterographic findings, accompany the article.

JOHN MARTIN, M D

Nielsen, M.: Carcinoma of the Cervical Stump after Supravaginal Amputation. *Acta obst et gynec Scand*, 1937, 17 295

Malignant degeneration of the cervical stump after supravaginal amputation has been considered a rare affection, but relatively numerous reports in recent years indicate a striking increase in the fre-

quency of this occurrence. In 1934, Graff gathered a total of 1,169 cases from the literature. This increase cannot be attributed to any increasing incidence of cervical cancer, nor to any change in surgical technique, it is probably due to the greater exactness of cancer control and registration. Within the last three years the author has observed 5 cases of carcinoma of the cervical stump in patients previously operated upon for myoma of the uterus by supravaginal amputation.

The term carcinoma of the cervical stump should be applied only to cases in which the supravaginal amputation is done for benign lesions, such as myoma of the uterus, and salpingo-oophoritis. These cases should be classified as true and false carcinomas of the stump. The false cases are those in which the stump carcinoma is observed within the first year after operation, for even though cervical cancer may develop within a few months, it is also possible that the carcinoma was already present at the time of the primary operation. In order to rule out the false case, it is necessary to examine closely any erosion, leucoplakia, and polyp for malignant degeneration and utilize all means for the diagnosis of all existing carcinomatous processes, including those in the central part of the cervix. In about one-fifth of the cases reported, the cervical stump carcinoma was observed within the first year after the primary operation.

Numerous factors have been blamed for the development of cervical stump carcinoma. Scar tissue in the cervix has been mentioned, but carcinoma seldom originates in the cervical canal, even though adenocarcinoma is considerably more frequent among the stump carcinomas than otherwise, 7.5 per cent against 2 per cent. Besides, there has not been demonstrated any case with extensive peritoneal or parametric cancer without the whole stump being carcinomatous. Hence it seems reasonable to assume that the scar tissue *per se* plays no particular part in the development of carcinoma. The decreased blood supply may play a rôle, but the size of the cervical stump seems to be of no great importance. The removal of both ovaries in the productive age has been thought to favor conditions for the development of cancer because of the resulting sudden atrophy of the cervix. The opposite view, that preservation of the ovary promotes the development of carcinoma has also been suggested. It is very doubtful whether extirpation of the ovaries plays a part as cancer of the cervix is seen to occur even in the presence of perfectly normal, functioning ovaries. Undoubtedly, parturition with tears and subsequent ectropion and erosion play an important part as predisposing factors in cervical carcinomas. Of the author's 9 patients, 3 were never pregnant, 4 had 1 parturition, and 1 had 2 children, in 5 there was either a pronounced pyosalpingitis or a preceding severe ad-

anterior lobe of the pituitary which produced increased secretory activity in the pancreas of experimental animals. In each of the cases reported, the pancreas showed histologically three typical characteristics:

1. Whereas in the normal control animal rarely more than one or two islands appeared in the field of vision in the animal treated with the hormone usually five or more islands appeared in the field of vision. The islands as well as the cells of the islands were usually much larger than those of the untreated animal.

2. The excretory glandular parenchyma in the treated animal presented glandular acini with high cylindrical epithelium in the outer zone and abundantly among the tubules of the secreting epithelium in the inner zone.

3. Constant definite recognizable hyperemia of the organ was noted by the author in the sections of Anselmino, Herold and Hoffmann. The pancreas was flooded with blood to the smallest capillaries so that all of the vessels were engorged. From his general surgical experience he reasoned that this extensive hyperemia ought to be of value in the treatment of acute pancreatitis.

In conjunction with Hoffmann and Herold the author has experimented for three years with the treatment of acute pancreatitis with hormone from the anterior pituitary lobe. His first experiences with commercial pituitary preparations were not significant. He saw no harm result from them but also no benefit. Later experiences proved that the pancreatic substance in the form of the dried powder soon loses all potency. It is also highly thermolabile. For clinical purposes the fresh preparation pre-

physon approaches the laboratory preparation of Anselmino and Hoffmann the closest. The method of treatment has been changed accordingly.

Immediately after the diagnosis has been made a venoclysis with normal saline solution is instituted. This solution should not be of higher temperature than 30° C. On the first day of treatment an ampoule of praephyson freshly obtained is injected every eight hours directly into the rubber tubing. On account of the danger of anaphylaxis the preparation is given every six hours by mouth in tablet form on the second day and this is continued until the diastase in the urine is normal again.

So far 9 cases of acute pancreatitis have been treated with pituitary hormone. In 6 the diagnosis was confirmed later by operation. The results are favorable. The diastase concentration in the urine decreased rapidly with clinical improvement which could not be attributed to the salt solution entirely. Operations on the pancreas and even on the bile passages could be done early and without danger. 2 cases in which stones were removed from the papilla are mentioned. Only 1 patient who developed a late abscess and peritonitis died.

So far there have been no experiences with cases of chronic pancreatitis or cases of true pancreaticoplexy. In cases of the latter type in which the vascular system is damaged badly early in the condition not much improvement may be expected.

In conclusion the author says that the number of observations is still too small to judge the effect of the hormone therapy on acute pancreatitis with certainty but he hopes that this report will stimulate interest in experimenting with this method of treatment for other conditions. LEO A. JENCKE, M.D.

The gonococcus is generally the primary agent, although secondary invaders as well as the tubercle bacillus and peritonitis, following acute appendicitis, also play a part

The clinical diagnosis by bimanual examination is difficult because the hydrosalpinx is soft, not easily outlined. Except for tenderness in the cul-de-sac and indefinite adnexal enlargement, generally diagnosed as cystic ovary, there are no positive signs to establish the diagnosis. Certain clinical facts suggest the diagnosis of hydrosalpinx: (1) salpingitis following minor gynecological maneuvers, (2) rapid disappearance of adnexal masses after attacks of salpingitis, (3) failure of diathermy treatment in chronic salpingitis, (4) intermenstrual pain, (5) intermittent hydrorrhea, and (6) preexistent pelvic peritonitis or ascites.

The roentgenological diagnosis is based on the appearance of the lipiodol after injection. When it reaches the hydrosalpinx it separates into small, well-defined, spherical droplets. This is evidence that the oil has fallen into a liquid. These droplets, moreover, most often collect in two symmetrical masses. Midline accumulation of the droplets is evidence of liquid in the cul-de-sac. This same appearance may occasionally be obtained in the presence of fundal carcinoma with abundant mucous exudate in a retroflexed uterus.

A second roentgen sign of hydrosalpinx is a well-defined tubal shadow. The shadow cast by the normal tube is diffuse and irregular. The author cautions that only small amounts of lipiodol should be injected whenever hydrosalpinx is suspected. As soon as droplet formation begins to appear under the fluoroscope, injection of oil is discontinued and a roentgenogram is made at once. The diagnosis of bilateral involvement can be made only twenty-four hours later when a second roentgenogram is made. Distention of the tube by too large amounts of the oil will cause the inflammatory process to flare up.

The progress of hydrosalpinx may take one of several courses: (1) it may remain unchanged, (2) it may increase in volume, or (3) it may become infected acutely on one or more occasions. Dilatation of the cervix, electrocoagulation or chemical cautery of the cervix, gynecological maneuvers, as well as diathermy treatments are contra-indicated. The treatment of hydrosalpinx is surgical, in mild, recent cases conservatism is justified.

HAROLD C. MACK, M.D.

Mintz, M. E.: Treatment of Obstructed Fallopian Tubes in Sterility by Diathermy and Tubal Insufflation. *Am J Obst & Gynec*, 1937, 34: 03.

Surgical reestablishment of the lumen of the fallopian tubes has met with only limited success. Any non-surgical measure which has some promise of improving the tubal status must be considered worth while. Repeated insufflation has in a number of instances proved to be effective. Diathermy treatment combined with insufflation exerts a reparative influence on some chronically diseased tubes

leading to the restoration of patency, and is followed by pregnancy in many instances.

The report is based on the treatment of 44 cases of tubal obstruction as determined by tubal insufflation before treatment was started. There were 30 cases of primary sterility and 14 cases of secondary sterility. In 25 of the 44 patients treated, patency was reestablished to some degree. Of these 25 women, 9 became pregnant and gave birth to normal children. Two patients developed ectopic pregnancies necessitating operation. In 14 instances no pregnancies have been noted as yet.

Each patient received diathermy treatments from one to three times a week, the total ranging from 15 to 59 treatments. Each treatment lasted from thirty to forty-five minutes, using from 2,500 to 3,000 ma. of current with the abdominal and sacral electrodes. When the abdominal and vaginal electrodes were used the current employed was only from 2,000 to 2,500 ma. The electrodes used were a concave vaginal electrode, and ordinary Cook's malleable tin metal, 5 by 8 in. long, 22 gauge, made by Westinghouse Electric Company, for the abdomen and sacrum.

EDWARD L. CORNELL, M.D.

Generson, L. R.: Ovarian Tumors (Zur Kasuistik der Ovarialtumoren) 1936 Basel, Dissertation.

This dissertation pertains to the ovarian-tumor material of the Gynecological Clinic at Basel from 1901 to 1934. There were 1,000 cases of ovarian tumor treated in these thirty-three years. The tumor groups were discussed individually.

1 Cystadenoma pseudomucinosum. There were 607 cases in this group. The operative mortality was 1.9 per cent. The case histories of the 12 patients who died are given in detail, as are also the histories in the other groups.

2 Cystadenoma serosum papillare. There were 118 cases in this group, with a primary mortality of 3.7 per cent.

3 Dermoid. Of 118 patients in this group, 1 died, giving a mortality of 0.8 per cent.

4 Teratoma. There were 4 cases in this group.

5 Fibroma. There were 6 patients in this group, 1 of whom died.

6 Sarcoma. Of 6 patients in this group, 3 died during their stay in the hospital.

7 Primary ovarian carcinoma. There were 60 cases with a mortality of 33.3 per cent in this group.

8 Secondary carcinoma. In this group the author places those cases in which malignant degeneration occurred in primary non-malignant tumors. There were 18 in the cystoma pseudomucinosum group, 45 in the cystoma serosum group, and 2 in the dermoid group.

9 Metastatic tumors. There were only 2 cases in this group.

The author gives no facts regarding the histological structure of the malignant tumors, nor a classification of the cancers. He also says nothing regarding the ultimate prognosis of the carcinomas.

(FAUET) LEO A. JUNKKE, M.D.

nexitis and in the entire material of cancer of the cervix 2 per cent of the patients had a preceding adnexitis. So perhaps it is the cervical erosion which is frequent also in myoma and adnexal lesions rather than the trauma of parturition that should be considered significant in the development of cervical carcinoma.

The question of the frequency of cervical stump carcinoma is very important, as it is closely connected with the problem of performing supravaginal amputation or total extirpation. Statistics on 1739 cases of supravaginal amputation show subsequent stump carcinoma in 67 (0.39 per cent). Other authors report an incidence up to 3 per cent. The author's 8 cases of stump carcinoma were found among 420 patients with cervical cancer (2 per cent). It should be borne in mind however that supravaginal amputation is performed not only for myoma of the uterus, but also for benign adnexal lesions. A calculation of the probabilities shows that the frequency of this lesion in relation to the number of cases operated upon may be estimated at from 1 to 1.5 per cent. The most effective prophylaxis against cancer of the cervical stump is total hysterectomy instead of supravaginal amputation. Still the danger of carcinoma of the stump is hardly great enough to warrant the greater risk associated with operation and the inconveniences which follow. The percentage of recovery is greater following total hysterectomy.

With a specially trained staff of surgeons the mortality of total hysterectomy can undoubtedly be reduced to the same level as that of supravaginal amputation as in the Mayo Clinic where the mortality from supravaginal amputation in 3035 cases was 1.2 per cent and from total hysterectomy in 1583 cases 1.8 per cent. In patients with marked obesity or with a pronounced heart lesion it is necessary to perform the rather simple procedure of supravaginal amputation. Most gynecologists prefer the supravaginal amputation as the chief method.

As a prophylactic measure against carcinoma of the cervical stump an additional radical curettage of the cervix or coneeate extirpation of the cervical mucosa has been suggested, also extirpation of the mucosa of the transitional zone, cauterization or electrocoagulation of the cervical mucosa, and later extirpation of the cervical stump through the vagina. However the author doubts the value of these prophylactic measures. Every patient on whom supravaginal amputation has been done ought to be under close observation and be frequently reexamined during the first year after the operation, especially in the presence of any erosion at the time of operation.

If electrocoagulation is done it should not be limited to the cervical mucosa alone but should extend to the border zone on the portio. The results of radiological treatment of carcinoma of the cervical stump are less favorable than those obtained in ordinary cases of cervical cancer. The prognosis is poor.

LOUIS NEUWELT M.D.

Oppert M. Radium Therapy of Carcinoma of the Body of the Uterus (Radium: thérapie du cancer du corps de l'utérus) *Gynécologie* 1937 36 437

Oppert has attempted to furnish a basis for decision on the choice of radium therapy or surgery in carcinoma of the body of the uterus. When the patient is less than sixty-five years old in good general condition and the vaginal cul-de-sacs are free of adherent changes surgery is the method of choice. However when general or local surgical difficulties present themselves, especially in older women radium should be the therapeutic agent. When there are parametrial infiltration and fixation of the uterus or when there is some general organic change such as hypertension, diabetes, obesity or cardiac failure there can be no question about radium being the correct choice. Radium is the preferred treatment especially when the cervix is only partially patent or is actually closed with pyometra, when there is a concomitant degenerated fibroma when the uterus is small and sclerotic in an aged patient and when a cervical polyp masks a vegetating carcinomatous endometrium.

The technique of implantation used by the author is not unusual. Provision for drainage of necrotic tissue and exudate is made and the radium tubes are packed in place for six days. The packing is iodiform gauze. The vaginal cavity is not cleansed during this time in fact the patient is left entirely alone. The author believes that one application is better than broken doses which require additional manipulation and instrumentation all of which are dangerous in a soft necrotic endometrium. He is not unaware however of the possible accidents with such treatment. Even with his dosage 50 millicurie hours per foration into the bladder or bowel may and some times does occur. He reports about a 33 per cent cure in his 23 cases but this he believes is a good result inasmuch as the cases could not be treated in any other way radium being the only recourse.

JOHN MARTIN M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Béclère C. Unrecognized Bilateral Hydrosalpinx (L'hydrosalpinx bilatérale ignorée) *Bull. Soc. d'obst. et de gynec. de Paris* 1937 26 381

The presence of bilateral hydrosalpinx is commonly unrecognized in ordinary gynecological examination. Because this condition causes definite functional disturbances the author discusses its various clinical aspects, its frequency, cause, clinical signs and treatment and points out how it may be diagnosed easily by roentgenological means. The author's experience covers 100 cases of unsuspected bilateral hydrosalpinx diagnosed in the course of 800 hysterosalpingographies over a period of ten years.

Latent hydrosalpinx is a relatively frequent lesion which accounts for from 19 to 28 per cent of female sterility. It follows chronic genital infections, causes intermenstrual pain and is a factor in functional uterine bleeding through its effects upon the ovaries.

with a pulse which was barely perceptible. Gynecological examination revealed the uterus to be enlarged about twice the normal size, anteflexed, mobile, and not tender. The cervical canal was closed and from it oozed a moderate amount of bloody fluid. In the right adnexa a small orange-sized cystic mass was palpated.

Because of the possibility of tubal ectopic pregnancy, an exploratory operation was performed. There was no blood in the peritoneal cavity. A mobile ovarian cyst on the right side was removed. The uterus was enlarged and cyanotic. Postoperatively, the metrorrhagia stopped within a few days.

On December 1, immediately after operation a forty-eight-hour Friedman test with the patient's urine revealed mild hypertrophy and congestion of the uterine cornua but no ovarian reaction in the test animal. On the same date, a similar test with fluid from the excised cyst revealed marked hypertrophy and congestion of the uterine cornua but no ovarian reaction. Another test with urine repeated on the fourteenth postoperative day revealed no alterations in the test animal. These tests indicate the presence of the ovarian hormones but the absence of the hypophyseal hormones.

Pathological examination of the ovarian cyst revealed it to be lined by lutein cells, smooth lined, and containing yellow limpid fluid.

The author discusses this patient's condition and compares it with other reports in the literature. These cysts characteristically produce amenorrhea as a sign of activity, and uterine hemorrhage as an indication of retrogression of the cyst and cessation of activity. Such a hemorrhage may also result from the removal of such a cyst if it is performed during the period of amenorrhea. In the differential diagnosis of this condition the absence of the hypophyseal hormones and the presence of the ovarian hormones in the patient's urine is of most value.

A. LOUIS ROSE, M.D.

Maliphant, R. G.: Menstrual Fistulas. *Lancet*, 1937, 232: 1509.

The term "menstrual fistula" was suggested in 1928 by Ballin for a sinus occurring in a laparotomy scar and from which there was a periodic discharge of blood more or less coincident with menstruation. Such a sinus may either communicate with the uterine mucosa or with aberrant endometrial tissue. The term "fistula" is strictly applicable to such a sinus only when it communicates with the uterus. Fistulous tracts leading from the uterus to the abdominal wall almost always follow surgical intervention. Their symptoms are pathognomonic. The history is usually that of postoperative incision fail-

ing to heal completely and having a small sinus which drains dark blood during menstruation. In some cases the skin closes and the menstrual discharge collects as a subcutaneous hematoma to rupture externally later.

The case reported was that of a thirty-nine-year-old primipara, who had had an appendectomy and a right salpingectomy eighteen months previously. Upon admission there was an extremely painful swelling in the left groin above and parallel with Poupart's ligament. This was treated by an incision over the swelling parallel to the inguinal canal below the external oblique muscle. An abscess containing foul-smelling pus was opened. The abscess cavity communicated with another intraperitoneal abscess. This incision did not heal and a sinus remained which regularly discharged blood coincidental with menstruation. The blood appeared simultaneously with the onset of the menstrual flow and disappeared several hours after the menses had ceased.

About four years later the patient was transferred to the gynecological department and the entire fistula excised. The pelvic organs were found buried in adhesions. The free end of the left fallopian tube was adherent to the posterior aspect of the inguinal wound and the canal in the parietes was continuous with the tubal lumen. The left fallopian tube and the canal in the abdominal wall were removed in one piece, and the abdomen was closed. The postoperative course was uneventful. Menstruation occurred a few weeks postoperatively and the wound remained dry.

Clinical reports on this type of pathology are uncommon. The literature contains 70 cases. These may be divided into two groups which are anatomically and etiologically distinct. In the first group the communication between the uterine cavity and the abdominal wall is direct. This type of fistula may follow ventrofixation, myomectomy, or cesarean section. It may be secondary to faulty operative technique, infection, subsequent adhesions of the uterine and parietal wounds, or the use of non-absorbable suture material.

In the second group the connection between the uterus and abdominal wall is indirect through one of the fallopian tubes or tubal stumps. There are also 3 cases on record of indirect uterine fistula of spontaneous origin.

The diagnosis is based upon the history of bright red blood discharged in or about the time of menstruation. The prognosis is usually good unless the fistula communicates with the bowel as well as the uterus. The treatment is usually surgical correction.

SAMUEL J. FOGELSON, M.D.

Compton B C. Malignancy of Granulosa Cell Tumors. *Am J Obst & Gynec* 1937 34 85

The patient at the age of forty four showed a large ovarian neoplasm on the left side with an enlarged somewhat boggy uterus but no menstrual irregularities or intermenstrual bleeding. Sixteen years later some years after the expected menopause she again presented an enlarged uterus with definite endometrial hyperplasia, a pelvic neoplasm microscopically identical with the first tumor and periodic uterine bleeding. These findings all show evidence of excessive and prolonged follicular stimulation produced by this feminizing type of tumor. Whether the second tumor arose from a granulosa cell test or from a recurrence of the previously removed tumor cannot be proved, but the evidence points to the former explanation.

EDWARD L CORNELL M D

EXTERNAL GENITALIA

Klaften E. The Combined Hormonal Management of Pruritus Vulvae (*Ueber die kombinierte hormonale Behandlung des Pruritus vulvae*). *Med Klin* 1937 1 566

The results of treatment of pruritus vulvae with injections of gynergon secale dispers suppositories calcibronat bromocrypturum and even with the roentgen rays were not satisfactory. In 22 cases only 6 patients were cured and 5 were benefited. Better results were obtained after the intramuscular injection of large doses of follicular hormone. After consideration of the fact that the greater portion of the hormone administered in this manner may be excreted without affecting the local disease area so that only a fractional part has therapeutic value the follicular hormone was administered percutaneously instead. Folipex ointment 50 gm of which contained 100 000 international units of follicular hormone was rubbed into the closely adjacent healthy skin each day. The favorable effect of this percutaneous method of administration on a very resistant case caused the author to extend the treatment with folipex ointment to 30 other cases of pruritus with resulting cures in 6 instances. Increased itching is first noted after the treatment is begun which however should not interrupt the continuation of the treatment. In 3 instances the ointment brought about complete cure even to full disappearance of the areas of kraurosis.

On the basis of this experience the following regime of combined treatment is recommended for pruritus vulvae and all dermatitis caused by ovarian hypofunction.

During the first week 30 000 international units of follicular hormone should be injected every other day and a daily application of 4 000 units of folipex ointment was made to the skin surrounding the affected area. During the second week the administration of 30 000 units of follicular hormone intramuscularly is alternated with the application of the folipex ointment every other day. During the

third week, from two to three ointment applications and two intramuscular injections of 30 000 units are given and during the fourth week, one or two ointment applications and two injections of 10 000 units of follicular hormone. The same treatment is repeated during the fifth week. From the sixth to twelfth weeks one or two ointment applications are given each week.

Thirty eight patients ranging in age from thirty to eighty two years were treated with this method. Cures were obtained in 25 instances. In 9 patients chiefly women with marked hypertension and atherosclerosis the condition was refractory. Recurrences occurred in 4 cases within from nine to twenty one months. For kraurosis vulvae a special ointment containing 50 000 international units of follicular hormone per 50 gm of ointment and 50 000 international units of Vitamin A is used for local treatment.

(HANS HEIDLER) HAROLD C MACK M D

MISCELLANEOUS

Motta G. Contribution to the Study of Pseudo pregnancy Endocrine Syndrome Amenorrhoea followed by Grave Metrorrhagia Due to Per latent Corpus Luteum Cyst (*Contributo allo studio d'Ue sindromi endocrine pseudogravide Amenorrhoea seguita da metrorrhagia grave per corpo luteo cistico persistente*). *Arch di ostet e ginec* 1937 15 1

It is known that cystic formations in the ovary of the follicular and corpus-luteum types are able to produce important functional and anatomical changes in the uterus. This is not the result of the mere presence or size of the cysts but rather to the continued physiological activity. It is therefore probably better to speak of persistent follicular or corpus luteum cysts when they produce their syndrome. The close normal relationships between the graafian follicle and the corpus luteum and the hypophysis results in a disturbed physiology when these structures do not regress normally. The author presents a short résumé of the theoretically possible disturbances in this relationship.

He then reports the record of a patient aged twenty nine a para iv who gave a history of the onset of the menses at twelve years of age and the occurrence of perfectly normal menstrual periods interrupted only by four normal pregnancies. The last menstrual period was on August 1. On the date of the expected menstrual period in September and October there was only slight spotting of blood. On November 1 menstruation began and continued throughout the month and the flow became especially copious on November 30 and December 1 with resultant collapse. Aside from the amenorrhoea there were no other signs of pregnancy. At no time had the patient noticed solid tissue in the menstrual blood.

Physical examination revealed a patient in collapse, markedly anemic intensely dyspneic, and

arsphenamine and 0.13 gm. of bismuth salicylate every week until delivery. In selected cases because of technical difficulties, 0.2 gm of bismarsen, is administered intramuscularly, as a substitute. There are no rest intervals during the prenatal period. This plan of management is carried out with the advice and coöperation of the Department of Dermatology of the hospital, and in the event reactions occur or there is a question of modifications or variations of treatment, the dermatologists are consulted. The control of the patients, however, is not relinquished.

Patients arriving at term are admitted to a special ward reserved for all venereal cases and are delivered in this ward.

Before the mothers' postnatal stay at the hospital is completed, all of the babies are roentgenographed for evidence of bone syphilis, and if evidence of lues is found, they are referred to the Infant Welfare Society, the Health Department of the City of Chicago, or the Pediatric Department of the Cook County Hospital for follow-up and therapy. If no evidence of lues is found, the mothers are instructed to report to the postnatal clinic with their babies at the end of six weeks. All still-births are also roentgenographed for evidence of syphilis.

The babies brought to the postnatal clinic receive a fontanel puncture for serology determination and are again roentgenographed. These tests are then repeated at three, six, and nine months, and one, two, three, and five years. If at any time evidence of syphilis is discovered, the baby is immediately referred for treatment.

Mothers receiving postnatal treatment are put on a modified plan of management consisting of ten weekly injections of 0.6 gm of neoarsphenamine and 0.13 gm of bismuth salicylate, followed by a rest period of two months, during which time instructions are given for continuing the treatment at home with mercury rubs and potassium iodide. Following their rest the patients return to the clinic for a Wassermann test and a second course of intravenous and intramuscular therapy. This plan is continued until the blood Wassermann test is consistently negative, at which time a lumbar puncture is done. If this is negative, the patient is dismissed as an arrested case, but Wassermann tests are made biannually for two years, then annually for five years. If, however, the patient should become pregnant at any time, the intensive therapy is reinstituted and continued to term regardless of serological findings.

As previously stated, there were 418 cases of syphilis among 10,016 prenatal mothers, an incidence of 4.17 per cent, which is somewhat lower

than that usually quoted for an institution of the type of Cook County Hospital. Here 348 mothers came to the clinic early enough to receive anti-luetic therapy. Seventy mothers received no therapy because they came to the clinic for the first time within a week or two of delivery. A few of these were seen early in the last month of gestation but, because of the necessity of a repeat Wassermann test followed by a provocative test in order to establish the diagnosis definitely, they were delivered before treatment could be started.

RESULTS OF TREATMENT

TABLE 1.—RESULTS OF 418 CLINIC CASES OF SYPHILIS (TREATED AND UNTREATED)

Amount of Treatment	5 or less	6 to 10	Over 10	No Treatment	Total
Live non luetic infants	94	96	134	40	364
Live but with evidence of lues (1st 2 weeks)	4	1	0	7	12
Still births	5	6	2	15	28
Abortions	3	2	1	8	14
Total	106	105	137	70	418

The results of treatment (Table 1) reveal at once not only the value of therapy in cases of syphilis in pregnancy, but also, and even more important, the advantages of instigating therapy early. The cases under "no treatment" refer only to those mothers admitted to the prenatal clinic who were delivered before receiving treatment.

Analysis of Table 1 reveals that in 348 prenatal cases treated, there were 24 failures. The salvage in the entire series of 348 cases treated was 92.9 per cent compared to 57.1 per cent in the non-treated cases.

It is an accepted but not plausible fact that luetic mothers may give birth to live non-luetic infants. Most workers agree that the probability of transmission to the infant is greater the more recent the infection. Mothers with latent lues of long standing may give birth to live, apparently non-luetic infants. There is little dispute since the advent of the Wassermann reaction that the method of transmission is by way of the placenta from the maternal circulation. The germ theory is no longer tenable. Cooke (3) is of the opinion that when the initial infection occurs during pregnancy, the extensive spirochetemia occurring during the primary and secondary stages of the disease always infects the placenta and then the fetus. However, since the infection has passed the acute stage, in some pregnant mothers, the infant may not be infected. Trans-

OBSTETRICS

SYPHILIS AND PREGNANCY

Collective Review

DAVID S. HILLIS, M.D., F.A.C.S. and S. J. BENENSOHN, M.D., Chicago, Illinois

THE numerous manifestations of syphilis in pregnancy are well known and the fact that syphilis is a very important cause of infant mortality has been established beyond question. Although it is true that a certain percentage of luetic mothers may give birth to non luetic infants, the effect of the disease is so serious that it must be presumed that tragic consequences will occur in all pregnancies complicated by syphilis. Therapeutic efforts should be instituted intensively and intelligently during the prenatal period to prevent the occurrence of tragedies and the transmission to the second or even the third generation. Estimates of the incidence of syphilis among prenatal patients vary from as low as 3 per cent to as high as 30 per cent. Zangemeister (21) reports from 7 to 5 per cent incidence in all ward cases in Germany. Von Jaschke and Pankow (5) report from 5 to 10 per cent incidence among their clinic patients and among the colored in our southern states the incidence has been reported as high as 30 per cent.

The acme of syphilis control has been attained in Denmark (24) in 1932 among 1,800 deliveries in one hospital more than one half of which were those of unmarried mothers; there were only 32 cases of maternal syphilis, an incidence of 1.7 per cent. In the same institution only from 1 to 3 cases of congenital syphilis are recognized each year. Although anti syphilitic legislation has been in effect in Denmark since 1790, since the post war epidemic from 1919 to 1931, the number of new cases reported in Copenhagen each year has dropped from 3,000 to less than 200. Congenital syphilis is proportionately infrequent. The relatively high incidence of maternal syphilis in the United States indicates the necessity for adequate prenatal care of our expectant mothers.

During the four year period from January 1, 1933 to December 31, 1936 16,742 women were delivered in the Obstetric Department of the Cook County Hospital. A total of 10,016 of these patients were admitted to our prenatal clinic

while the remainder, or 6,726 patients, either had no prenatal care, or were referred to the hospital by outside prenatal clinics or private physicians. Four hundred and eighteen of the 10,016 women with prenatal care were luetic and 9,598 were non luetic.

All patients entering the prenatal clinic are put through an intensive routine medical and obstetric examination. During the four year period 10,340 blood tests were made for syphilis as a routine procedure. There were 3 to 4 plus reactions in 280, or 2.7 per cent, of these patients and 1 to 2 plus reactions in 456, or 4.5 per cent. Since a 3 to 4 plus reaction is accepted as positive evidence of syphilis patients showing such a reaction are immediately given intensive treatment. The test was repeated in those patients showing a 1 to 2 plus reaction. If the weak positive reaction persisted then a provocative Wassermann test was performed. If the reaction following the provocative test was still weakly positive or negative, no treatment was instituted. In this series of cases there were 456 repeat Wassermann and Kahn tests; 202 were negative and therefore a provocative test was not deemed necessary. Although the Wassermann test gave a 2 plus or less reaction in 79 of the 456 cases there was a definite history of lues and therefore, these patients were immediately given treatment. The reaction continued to be weakly positive in 175 cases after the repeat Wassermann test and in these cases provocative tests were performed. Three tenths of a gram of neoarsphenamine is used for a provocative test at the Cook County Hospital Prenatal Clinic. Fifty nine of the 175 provocative tests gave 3 to 4 plus reactions. The reliability of these diagnostic procedures will be discussed further.

Following the diagnosis of syphilis, expectant mothers are treated in the prenatal clinic at the hospital rather than referred elsewhere. These women are instructed to report to the anti luetic clinic once a week throughout pregnancy. In addition to the routine prenatal management they are given intensive anti luetic therapy consisting of the administration of 0.6 gm. of neo-

most therapy during the prenatal period, and the lowest percentage occurred in mothers receiving no therapy. It is obvious, therefore, that the more impressed the patient is concerning her disease and the more conscientious she is about her prenatal care, the more coöperation can be expected insofar as follow-up both for mother and child is concerned.

Among the 30 infants showing evidence of congenital syphilis as revealed by the x-ray examination (Table II), only 4 had positive serology reactions at the six-week period. One of these infants had 2 plus Kahn and Wassermann reactions, 1 had 4 plus Wassermann and Kahn reactions, and 2 had 1 plus Wassermann or Kahn reactions at the six-week period. In the remaining 26 cases of congenital lues, the Kahn and Wassermann reactions were negative. In order to eliminate the possibility of error, the serology tests were repeated twice in 7 cases and three times in 2 cases with negative reports in each instance. In this series of cases serology has been found to be unreliable as an aid to the diagnosis of early congenital lues. In 1 case an infant had 3 negative Kahn or Wassermann reactions at various intervals from six weeks to two years. At two and a half years the Wassermann reaction became positive for the first time. Diagnosis had been made with the x-rays at the first year check-up. This indicates the shortcomings of the Wassermann reaction in the diagnosis of early congenital lues.

Among the 30 luetic infants (Table II), we were able to diagnose the disease in only 19 cases at the six-week period. In the remaining 11 cases the x-ray examination was negative at the six-week examination, in 7 of these cases the x-ray revealed evidence of lues when repeated at three and four months, and in the remaining 4 cases early roentgenology was negative until after six months. Since in 11 cases x-ray examination failed to disclose evidence of lues at the six-week period, the importance of repeated x-ray examination in the early diagnosis cannot be emphasized too strongly.

Twenty-five of the mothers whose infants showed evidence of congenital lues had 4 plus positive serology reactions before therapy was initiated in pregnancy, and at the first post-natal examination. This showed the value of follow-up of the infants of mothers whose blood reactions remained strongly positive in spite of treatment.

ABORTIONS

There were 14 cases of lues (Table I) that terminated in abortion among our clinic patients.

Eight of these patients received no therapy and aborted shortly after the first prenatal visit. One of these patients became pregnant again within three months after aborting and nine months later, after intensive therapy, gave birth to a live, apparently non-luetic infant. Five of the 8 patients who had received no therapy were multiparas and had had one or more previous abortions. Of the remaining 6 patients who received treatment, 3 had had three or more abortions.

An interesting statistical observation is that of the 324 mothers who had been under treatment and had delivered non-luetic infants, 64 had had one or two abortions and 45 had had three or more abortions.

STILL-BIRTHS IN CLINIC CASES

Of the 28 clinic patients who had luetic stillbirths, 15 had received no therapy (Table I) because they had not attended the clinic early enough in pregnancy. The serology was 4 plus in 8 of the untreated cases. In 6 the serology reaction was 2 plus or less but 3 of these gave a history of previous anti-luetic therapy. In the 1 remaining untreated case the serology report was plus-minus, but delivery occurred before a provocative test could be performed. Eight of these untreated patients had had two or more previous abortions and 1 patient, a gravida-viii with a history of five previous abortions and a negative serology reaction, had refused treatment. At the sixth month she was delivered of a macerated luetic fetus. Another patient in this series had been under treatment during an earlier pregnancy and had given birth to a live non-luetic infant. During the present pregnancy she received no therapy and at term a macerated luetic fetus was delivered.

A comparison of the results in luetic patients who had not received any treatment before pregnancy with those cases which had received treatment before pregnancy is shown in Table IV.

Further analysis reveals that in 40 new cases of maternal syphilis not receiving treatment, only 20 infants were born alive and without evidence of lues during the first two weeks of life. This represents a 50 per cent loss as compared to a 33 per cent loss (10 of 30 cases) in luetic mothers who had at some time in their lives received anti-luetic therapy. Among 214 new cases receiving treatment there were 15 failures and a salvage of 93 per cent as compared to 9 failures and a salvage of 93.6 per cent in 134 old luetic treated cases. The total salvage is almost equal in both groups. However, in 47 old luetic cases which were given more than ten treatments, the gross salvage was

mission is dependent upon active spirochetes in the blood stream and, therefore, Cooke believes that transient periods of spirochetemia occur in cases of latent lues and that these periods of spirochetemia become less frequent as time passes on. If a period of spirochetemia occurs during pregnancy, then the fetus becomes infected. It is interesting that many luetic mothers have never had clinical manifestations of the disease and give no suggestive history. Cooke suggests that such a patient may acquire the infection from her husband long after he has received his initial infection and that the spirochete lies dormant in the testicle and is transmitted to the mother by means of the semen. Entering the mother in a dormant state, the spirochete does not produce the active manifestations of the primary or secondary stage but remains dormant in some organ in a latent or attenuated state. The chances of transmission from mother to infant have been quoted as from 100 per cent to 50 per cent. In our series, 26 infants of 70 untreated luetic mothers did not show evidence of congenital lues from the first six months to one year of life.

The salvage among our treated cases compares favorably with reports from other clinics. At the Johns Hopkins Clinic the salvage in 943 treated cases varied from 89 to 100 per cent, depending upon the amount of treatment and at Guy's Hospital in London the salvage in 485 treated cases was 91.8 per cent, while the live babies in the untreated cases amounted to 71.96 per cent. McCord (7) reports that in 403 colored women who were treated the salvage was 94 per cent, while the live babies in 116 untreated colored patients amounted to only 33.8 per cent. It is noteworthy that in 137 cases in our clinic receiving ten or more treatments there were only 3 failures—a salvage of 97.8 per cent compared to a salvage of only 92 per cent in cases receiving six to ten treatments, and a salvage of 89 per cent in cases receiving five or less treatments (Table I). The Cooperative Clinical Study (23) in reviewing 3,817 cases reports a 78 per cent salvage in cases in which treatment was started before the fifth month, as contrasted to a 61 per cent salvage in those cases in which treatment was started after the fifth month. Costello and Rackoff (4) report a salvage of 97.5 per cent in cases receiving six or more treatments. These statistics corroborate our own findings pertaining to the advantage of early therapy.

FOLLOW UP

Unfortunately many reports fail to include follow up statistics on infants delivered of luetic

mothers. Follow up statistics on our cases are available in only 252 of 364 infants discharged as apparently non luetic (See Table II).

TABLE II—RESULTS OF FOLLOW UP IN 252 PRENATAL CASES WITH AND WITHOUT TREATMENT

Amount of treatment	5 or less	6 to 10	Over 10	No treatment	Total
Non luetic infants	58	34	97	26	215
Infants showing evidence of lues	7	10	5	8	30
Total	65	44	102	34	245
Percentage of salvage	88.8	84.0	94.5	77.0	

The net salvage in our series after follow up varying from a period of six weeks to five years was 196, or 80 per cent of 218 treated cases, compared to 26, or 77 per cent, non luetic infants in 34 untreated cases.

In this series of cases followed up it is especially noteworthy that in 97 mothers receiving ten or more treatments there were only 5 failures—a salvage of 94.5 per cent.

As was stated previously at the six week period and at each of the intervals that the infants are returned, blood is drawn for serological examination and x ray examinations of the long bones are made. We attempt to follow these cases for as long a period of time as it is possible to persuade the mothers to return their infants to the clinic. Of the 222 non luetic infants (Table II), 96 were followed for a period of from six weeks to three months, 54 were followed for six months, 45 were followed for one year, and 27 were followed for a period of from one to three years (Table III).

TABLE III—THERAPY IN SALVAGED CASES IN RELATION TO DURATION OF THE FOLLOW UP

Duration of follow-up	Total	Less than 5 treatments	5 to 10	10 or more	No treatment
6 weeks to 3 months	96	34	6	2	24
6 months	54	4	27	17	2
1 year	45	6	4	35	
1 to 3 years	27	2	7	3	
Total salvaged	222	66	44	0	26
Total in the prenatal clinic	418	206	205	37	70

Analysis of Table III reveals that the highest percentage of mothers who returned their infants for check up occurred in the group receiving the

per cent Laurence (6) investigated the clinical significance of 839 incomplete Wassermann reactions. He found clinical symptoms in 70 of 251 cases with weak positive reactions, and there was a suggestive history in 22 cases. He feels justified in regarding weak positive reactions with suspicion.

Bartholomew (1), analyzing 302 fetal deaths due to syphilis, found that 87 per cent of the mothers had a 3 plus or more Wassermann reaction. Had the Wassermann test been used as a basis of therapy, if his cases had been treated, he would have failed to prevent congenital lues in 13 per cent.

Nevinmy (9) reports the death of a child from congenital lues, who was born of a mother giving repeated negative Wassermann reactions.

Schuman and Baines (15) report 6 cases in which women with negative Wassermann reactions gave birth to luetic infants.

As stated previously, of 119 mothers who consistently reacted weakly to repeated serology and provocative tests, 2 gave birth to luetic infants, and of 19 mothers who had negative to 2 plus reactions but who underwent no provocative tests, 1 gave birth to a luetic infant. Since false positive reactions seldom occur, it seems advisable to treat all patients with positive reactions, regardless of the intensity of the reaction. Stillians (17), Ohver (10), Bundesen (2), and Vonderlehr (19) have indicated their agreement in this opinion.

It is a known fact that the administration of arsenicals carries a mortality. Would we, then, be justified in subjecting a few non-luetic mothers with false positive Wassermann reactions to the dangers of arsenic in order to salvage an additional 3 per cent of babies whose mothers would not receive therapy because of weak positive Wassermann reactions? Perhaps, time permitting, the dangers of arsenic can be minimized by liver and kidney function tests.

In our series of cases treated there was 1 death. Rosensohn (13) reports two ante-partum deaths following arsphenamine therapy.

Shivers (14), in quoting the Cologne Commission, reports 1 death in 11,398 injections. Stokes (18) reports 9 deaths in 63,000 injections. A report of the U. S. Navy made by Phelps (11), from 1925 to 1928, discloses 17 deaths in 273,354 injections. The German government reports 1 death in 10,984, and the British government reports 1 death in 13,000 injections. Mortality, based upon the number of injections made in our clinic, would then be 1 in approximately 5,000 injections.

Plass and Woods (12) reported 3 fatalities in young luetic pregnant mothers due to arsenical hemorrhagic encephalitis. After a review of the literature, they are of the opinion that the pregnancy makes the luetic patient more susceptible to the deleterious as well as to the beneficial effects of anti-luetic therapy by the modern arsenicals.

On the other hand, the statistics obtained from the Cooperative Clinical Group (22) indicated that the luetic pregnant woman is less susceptible to reactions than the non-pregnant. In 4,580 treatments given to pregnant syphilitic patients there were 82 reactions as compared to 1,324 reactions obtained after 55,066 treatments to non-pregnant women. These contradictory findings indicate that more information should be collected before definite conclusions are drawn. A mortality associated with the administration of arsenicals cannot be denied. However, the plan of treating all cases with positive serology is justified, particularly if the reaction continues even weakly positive after repeating the test and after a provocative test, if by so doing 3 per cent more babies will be salvaged. However, great caution should always be exercised in the administration of the arsenicals.

CONCLUSIONS

1. The results in 418 cases of syphilis and pregnancy admitted to the prenatal clinic of the Cook County Hospital are analyzed, 348 cases received treatment, with a total of 46 failures, a net loss of 13 per cent. These failures included abortions, still-births, and all infants which, though born alive, showed evidence of lues. In 70 untreated cases there were 38 failures, a net loss of 54 per cent.

2. The net salvage in cases receiving ten or more treatments was 93.2 per cent as compared to a net salvage of 82 per cent in cases receiving less than ten treatments.

3. Mothers who have received therapy previous to becoming pregnant have the best chance of bearing live non-luetic infants if intensive therapy is administered during pregnancy, regardless of serology.

4. Serology tests in newborn infants are of little value as an aid in diagnosis of early congenital syphilis.

5. The management of Wassermann 1 to 2 plus reactions in pregnancy requires further investigation. At the present time the evidence seems to justify treatment in cases with positive serology tests, regardless of the intensity of the reaction.

TABLE IV—A COMPARISON OF RESULTS AMONG 254 NEW CASES OF LUES AND 164 OLD CASES

Number of treatments	254 new cases				164 old cases			
	± 3 to 5	5 to 10	10 or more	None	± 3 to 5	5 to 10	10 or more	None
Live births	55	57	87	20	39	30	47	20
Live but luetic	2	2	5	5	5			1
Still births	3	3	1	0	3	3		0
Abortions	3		1	6		2		2
Total	63	62	94	40	47	44	47	23

100 per cent, compared to a 96.7 per cent salvage in new cases of lues. These statistics justify and emphasize the importance of intensive therapy during each pregnancy, regardless of the amount of therapy received prior to pregnancy and regardless of serology findings.

RESULTS OF SEROLOGY REACTIONS

As previously stated, 456 patients had a plus minus to a 2 plus serology reaction after the initial routine Wassermann test. Seventy-nine of these patients gave a definite history of lues and were immediately given treatment. Repeat Wassermann reactions were 1 and 2 plus positive in 194 patients. Provocative tests were performed upon 175 of the 2, and revealed 59 with 4 plus reactions. In 119 cases after provocative tests the Wassermann reaction was negative to 2 plus and treatment was not instituted. Sixty-one of these 119 mothers were followed after delivery and in 2 infants, 1.7 per cent, congenital lues was diagnosed. In 19 cases with from plus minus to 2 plus reaction, in which no provocative was performed, 1 baby (5.2 per cent) was luetic. These figures indicate that as outlined earlier in this paper in carrying out our plan of management there will be 3.5 per cent of the mothers with from plus minus to 2 plus reactions and regarded as non luetic who will give birth to syphilitic babies.

Of 348 mothers treated, only 5 developed arsenical reactions requiring cessation of arsenic therapy. One patient died as a result of therapy. This patient, aged twenty-one, was a gravida IV para 0 at the time of death. On January 10, 1934 she was seen in the hospital for the first time in the process of aborting. The Wassermann reaction at that time was negative. She had had two previous abortions. She was next seen at the postnatal clinic eight weeks later when a repeat Wassermann reaction was reported as 4 plus. She then failed to return until nine months later at which time she was four months pregnant, and a repeat serology examination was 2 plus. However she was given anti luetic therapy and re-

ceived two injections of 0.3 gm. of neosarsphenamine at intervals of one week, followed by two injections of 0.6 gm. of neosarsphenamine at the same intervals. On April 23, 1935, one week after the fourth treatment, the patient returned to the clinic with a generalized exfoliative dermatitis and was admitted immediately to the hospital on the dermatology service. She died undelivered on May 12, 1935, seven weeks after the first treatment and four weeks after the last. The cause of death as reported by the coroner's physician was "arsenic poisoning."

DISCUSSION

Since pregnancy occurs so often among mothers with latent lues who do not have a suggestive or suspicious history of the disease, the serological examination becomes a most important procedure in the diagnosis of syphilis. The opinion has been quite general that there is a degree of inconsistency inherent in serology tests performed upon pregnant women. Some workers prefer to consider only strong positive serology reactions as diagnostic of lues and weak positive reactions in the absence of a definite history as not sufficient evidence to justify therapy. Nakayama (8) after exhaustive serological studies on pregnant mothers and their offspring, concludes that the blood reaction is of very little value in the diagnosis of syphilis. He is of the opinion that the parturient function causes a remarkable change in the reactive substance. Stillians (16), on the other hand, after studying the serology reactions of 6,954 pregnant women states that false negative reactions occur in pregnancy but false positive reactions occurred in not more than 2.5 per cent of the cases. He concludes that the Wassermann reaction has almost the same diagnostic value in the pregnant as in the non pregnant state. Wise and Shaw (20) maintain that false positive reactions in pregnancy are negligible. In their series of 100 luetic mothers the Wassermann reaction was strongly positive in 95 per cent of the cases, weakly positive in 4 per cent and negative in 1

a vitamin deficiency is the cause in Italy, Bulgaria, and India, but the poor results obtained with vitamin therapy contradict this view. It is highly probable that the cause of this anemia in many of the cases reported lies in parasitic diseases and not in the pregnancy. A septic disease with hyperchromic anemia is not a true pernicious form of the anemia of pregnancy. The large number of cases reported in certain countries can finally be explained by incorrect diagnoses. Many cases of secondary anemia are included in the pernicious form of the anemia of pregnancy only because of an increased color index. The determination of the hemoglobin and the erythrocyte count are investigations subjectively influenced and subject to error. A high color index may be due to technical or other errors. Besides, secondary anemia often shows irregular and immature erythrocytes without necessarily indicating a serious blood disease. The diagnosis of the pernicious form of anemia should be made only in the presence of pronounced toxic symptoms, signs of a progressive anemia, and an increased function of the bone marrow, a leucopenia and leucocytosis have also been reported. The color index is often below 1.0, which does not speak against the diagnosis. Some believe that the disease is due to a placental toxin, that it is a toxicosis of pregnancy of unknown origin, that the bone marrow is injured either by previous diseases or pregnancies at short intervals, that it is Biermer's disease with remissions, and that a low cholesterol content of the blood serum is responsible.

The differential diagnosis from Biermer's disease is difficult, patients do not recover from the latter. The combination of Biermer's anemia and pregnancy was rare formerly, but since the use of liver therapy it has become more frequent. In the pernicious form the symptoms of spinoparalysis and oral and gastric symptoms are almost never present. The differential diagnosis also includes other toxic complications of pregnancy, premature separation of the placenta, and other causes of anemia, but offers no difficulties with careful study.

The prognosis in untreated cases is grave, the mortality is up to 100 per cent, but since the introduction of blood transfusions and liver therapy the mortality is much lower. The earlier the treatment, the better the prognosis, but cases that do not show signs of a pronounced toxicosis and progressive anemia should not be treated as the pernicious form of the anemia of pregnancy. The signs of a grave prognosis are a yellowish skin, hemorrhage from the skin or mucous membranes, less than 1,000,000 erythrocytes per c. cm. of blood during pregnancy and less than 700,000 during puerperium, diminution of the immature erythrocytes in spite of progressive anemia, rapidly developing leucocytosis, and marked lymphocytosis. The prognosis is worse in primiparas than in multiparas. The earlier the symptoms appear, the worse the prognosis. The disease usually appears in the sixth or the seventh month of pregnancy. The gravest time of the disease is not dur-

ing the pregnancy, but from the first hours to days after the delivery, when death often occurs in severe shock. If death does not ensue, recovery follows in a few months. Premature interruption of the pregnancy gives a bad prognosis for the child.

The morbidity of this disease is considerable; pyelonephritis and septicemia are usual complications in the puerperium. Recurrences of the anemia have been reported.

Symptomatic therapy with bone marrow by mouth and injections of the blood of pregnant women, neosalvarsan, and many other preparations have proved practically futile, but numerous hopeless cases have been cured and the mortality has been lowered to 15.6 per cent with blood transfusions and liver therapy. The interruption of the pregnancy is no longer necessary with this treatment. In light cases liver therapy without the interruption of pregnancy is allowable, but in cases with severe or progressive anemia the pregnancy should be interrupted.

The author observed the pernicious form of anemia in 4 of 43,363 cases of pregnancy. Several cases with puerperal septic complications, septicemia or pyelonephritis, showed a hyperchromic anemia, but the author does not consider these as pernicious anemias but as secondary anemias of inflammatory origin.

LOUIS NEUWELT, M.D.

Kahr, H.: *Thrombophlebitis in Pregnancy, with Special Reference to the Conduct of Labor* (Ueber Thrombophlebitis in der Schwangerschaft im besonderen Hinblick auf die Geburtsleitung) *II ten med Wchnschr*, 1937, 1 564.

Four cases of thrombosis of the deep femoral or pelvic veins are first described. The first was that of a woman thirty-four years of age who had undergone gastric resection for gastric ulcer. Later, thrombophlebitis involving the right lower extremity developed. She was admitted to the First Gynecological Clinic at Vienna in the thirty-first week of her third pregnancy with the history of swelling of both legs for two weeks. Three weeks before admission to the clinic a Bartholinian abscess on the right side had been incised. She presented a twin pregnancy and edema of both lower extremities, most marked on the right side. Spontaneous delivery occurred after eleven hours of labor. Both twins were in cephalic presentation. The births were fifteen minutes apart. The first twin weighed 2,500 gm and was 47 cm long, the second weighed 1,850 gm and was 44 cm long. The puerperium was normal. Marked regression of the edema in the right leg was noticed on the eleventh postpartum day. The patient was discharged in good health on the thirtieth postpartum day.

The second case was that of a thirty-eight-year-old woman who had had two spontaneous deliveries and three miscarriages. Three years previously the left adnexa had been removed because of tubal pregnancy. Soon after the last menstrual period a swelling appeared in the region of the left knee joint, which

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PREGNANCY AND ITS COMPLICATIONS

Cordaro, G The Motor Activity of the Ureter during Pregnancy (*L'Attività motoria ureterale durante la gravidanza*) *Riv Ital di ginec* 1937 30 92

The author reviews briefly the literature on the motor activity of the ureter with special attention to this activity during the pregnant state. He reports a series of studies in patients to demonstrate this action. Ninety two patients were studied. The apparatus used permitted a precise registration of ureteral peristalsis during the course of catheterization of the ureter. It is described in detail. A large number of kymographic tracings are reproduced to show the results.

In normal females used as controls, it was found that the right ureter was capable of exciting a force up to about 30 c cm of water. Studies in females during the first four months of pregnancy revealed no deviations from the normal. After the fifth month there was a definite decrease in the force of the contractions down to about 20 c cm and the movements of the ureter were definitely slower and of decreased amplitude. After the sixth month there was still greater inhibition so that the force mainly dropped to 15 c cm and the peristaltic movements were still slower. After the seventh month the pressure dropped to 10 c cm and the peristaltic movements were barely demonstrable and were separated by very long rest periods. After the eighth month the ureter was completely atonic barely resisting 5 c cm of pressure and there was a complete absence of movements. At the conclusion of the uncomplicated pregnancy the function returned to normal within a few days.

The studies of patients with cystopyelitis indicated that the ureter becomes relatively atonic early and is no longer able to expel urine; this condition results in stasis. After the conclusion of the pregnancy in these patients there was a tendency for the

function of the ureter to return to normal but in many the return was not complete.

A LOUIS ROSE MD

Koettmeyer H L The Pernicious Form of Anemia of Pregnancy (*Die perniciosiforme Schwangerschaftsanämie*) *Acta obst et gynec Scand* 1937 17 265

The pernicious form of the anemia of pregnancy is generally considered rare but many cases have been reported in Italy, Bulgaria, India, Switzerland and Denmark. It is a serious disease with a bad prognosis; death occurs in up to 65 per cent of the cases. It occurs chiefly in multiparas appearing generally in the last four months of pregnancy. The symptoms become aggravated during the course of pregnancy and often the disease is combined with other toxicoses of pregnancy. If the anemia is not fatal the patient recovers after the delivery. Some of the women suffer with a secondary anemia for a long time previous to the pregnancy but usually no explanation can be found in the past history for the development of the severe anemia.

The cause of this disease is unknown. During the pregnancy one usually finds almost physiologically a secondary anemia with occasional very low blood values. The severely toxic pernicious form has nothing to do with this anemia. Sometimes an anemia with a pernicious like blood picture is seen in pellagra, beri beri or chronic infectious diseases like tuberculosis or malaria. This anemia becomes aggravated during pregnancy but has a far better prognosis than that associated with the severe toxic symptoms of the pernicious form of anemia of pregnancy. Because of the frequent occurrence of this disease in certain countries especially Italy and India some seek the cause in the soil or climatic conditions or consider the disease infectious but evidence does not support these beliefs. Some believe that the Welch bacillus is responsible while others deny this. Certain investigators believe that

pelves (2.12 per cent) in this period. In 100 (37 per cent) of those with contracted pelves, labor was induced somewhat before term, in 21 (7.7 per cent) delivery occurred spontaneously more than ten days before term. In one case a still-born child was delivered spontaneously before labor began, in 7 cases a low cesarean section was done at the beginning of labor, in 141 cases (52.2 per cent) the woman was submitted to the test of labor, and in 7 of these the pregnancy was terminated by low cesarean section.

The labors in women with contracted pelves were rarely of short duration, in many cases the duration was from twenty-four to forty-eight hours; labor of over forty-eight hours was not infrequent. In 8 cases labor lasted from fifty to ninety-nine hours after the first painful contraction. In 2 of these cases the infant died during labor, and in one the mother died also after craniotomy had been done. In one case forceps were used to terminate the labor, in one case hemorrhage occurred at the time of delivery, but both mother and child lived. In the other cases of prolonged labor, there were no complications.

In 60 per cent of the cases submitted to the test of labor a healthy infant was delivered spontaneously, and the mother had a normal or nearly normal puerperium. In about 30 per cent artificial delivery with forceps, version, or low cesarean section was necessary. Almost one-third of the infants died during the course of labor or in the next few days.

Hemorrhage occurred at delivery in 16 (11 per cent) of the women submitted to the test of labor. The hemorrhage was rarely severe, in only 1 case was the blood loss more than 1,000 gm. There was 1 death from obstetrical shock. Puerperal infection occurred rarely and no more frequently than in other deliveries in the hospital. Cesarean section done after labor had been allowed to continue did not give as good results as that done at the beginning of labor, there was 1 maternal death following this procedure.

In regard to the infant in the test of labor, the following complications were observed: 6 cases of prolapse of the cord, 3 infantile deaths during labor, cause unknown, 8 cases of fetal distress of doubtful origin necessitating immediate artificial delivery, 3 cases of cerebral hemorrhage, all fatal, 2 occurring after forceps delivery and 1 after spontaneous delivery.

In the cases in which the test of labor was employed, there were 3 maternal deaths, a maternal mortality of 2.12 per cent. In 1 case death was due to toxemia, in another case to septicemia after a delayed cesarean section, and in a third case to obstetrical shock. The general maternal mortality for 12,701 deliveries in the ten-year period studied was 0.42 per cent. The infantile mortality was undoubtedly high, there were 20 infantile deaths, a mortality rate of 1.4 per cent, and the general infantile mortality in the obstetrical department, i.e., during labor or shortly after, was less than 4 per cent.

In the 100 cases in which labor was induced shortly before term, in the ninth month of gestation, only 1 of the women died, and death in this case was due to cardiac disease. There was no maternal mortality that could be attributed to the procedure *per se*. The infantile mortality was 13 per cent, very little lower than with the test of labor. It is to be noted also that in the group of women with contracted pelves there was a greater percentage of spontaneous premature deliveries than is observed in women with normal pelves.

On the basis of these findings, the authors recommend that the test of labor be used in severe degrees of pelvic contraction in which a low cesarean section will probably be indicated without much delay, it should also be used in the lesser degrees of pelvic contraction in which a spontaneous delivery may be expected, and it may be employed in moderate degrees of pelvic contraction in which the obstetrical history indicates that a living child can be delivered. In determining the degree of pelvic contraction, the use of digital pelvimetry should be combined with radiological methods. A test of engagement of the head by the method of Pinard or Voron should be employed. In moderate degrees of contracted pelvis in which the indications are that a child weighing at least 2,500 gm can be delivered spontaneously, induction of labor before term is a suitable method for the benefit of both the mother and the infant.

ALICE M. MEYERS

Sunde, A. Spontaneous and Artificial Rupture of the Membranes during Labor. *Acta obst et gynec Scand*, 1937, 17: 133.

The author states that his material can be used only to illustrate the importance of spontaneous rupture for parturition and the puerperium, as he does not employ the method of artificial rupture in premature delivery, in which he prefers the insertion of a balloon. He adopts forcible rupture of the membranes mainly in placenta previa and in hydramnios. Nor are the explorations desirable for judging as to the significance of the rupture of the membranes employed by him, because he follows the principle of as little internal examination as possible. Explorations must sometimes be made for instructional purposes, but then only shortly before the termination of labor so as to diminish the risk of infection.

The terminology of this subject is very confusing. Leaving out of account the escape of amniotic fluid during pregnancy, there are four different concepts, each demanding a special name: (1) rupture of the membranes before the onset of pains or painful contractions, (2) rupture after the onset of pains, but prior to complete dilatation of the cervix and os, (3) rupture on completed dilatation, and (4) rupture occurring after complete dilatation. He applies the term primary escape of fluid for rupture of the membranes before the onset of labor pains. The term ordinary escape of fluid is applied to escape of fluid in all cases of rupture after the pains have begun, when the size of the os uteri at the time of rupture

gradually extended upward. When she was first seen the pregnancy was in the third month. A poorly defined area of resistance was palpable to the left of the uterus; this is undoubtedly the site of the thrombosed veins. Only after complete bed rest for three months was there a recession of the symptoms and signs. The patient was discharged from the clinic in the sixth month of pregnancy. No further swelling occurred. Premature breech delivery took place at home at eight months. The duration of the labor was fifteen hours, a 2,000 gm fetus was stillborn. The puerperium was uneventful.

The third case was that of a woman aged forty-five years. She had had one pregnancy fifteen years previously. A swelling of the left saphenous vein had occurred in the twenty-first week of the second pregnancy and developed into marked thickening of the left thigh. After a period of five weeks during which the swelling had subsided, a marked swelling of the entire left lower extremity developed which required further bed rest for twelve weeks. Spontaneous delivery of a 3,400-gm living child occurred after seven hours of labor. An uneventful puerperium followed.

The last case was that of a twenty-eight-year-old primigravida. Three weeks before delivery she had a feeling of heaviness in the left leg with pain and subsequent swelling extending to the inguinal region. Hard resistant painful cords were palpable in the course of the saphenous vein. There were edema and cyanosis of the left thigh. A cord like thickening was palpable to the left of the mid line by vaginal examination. The legs were elevated and leeches were applied. Labor began three weeks after the appearance of the thrombosis. Sixteen hours later there was spontaneous delivery of a living child in the posterior position. It weighed 3,510 gm and was 52 cm in length. Rapid regression of the swelling followed three days postpartum, and complete recovery from the thrombosis took place.

Following the discussion of these 4 cases, Nos. 1 and 3 with thromboses of the deep femoral veins and Nos. 2 and 4 with thromboses of the pelvic veins, synopses of the case histories of three women with superficial thromboses of the lower extremities during pregnancy were presented. Spontaneous delivery occurred in these cases without complications.

These 7 observations show that in cases of thrombosis of pregnancy, labor may be allowed to proceed normally in the presence of normal pelvis and soft tissue structures and normal fetal presentation. Certainly, labor provides sufficient impetus which might lead to liberation of a thrombus in the femoral or pelvic veins; nevertheless, this did not happen in any of the 7 cases described above, nor has this ever been reported in the literature. In Holzmänn a case death from embolism did not occur in labor but rather in pregnancy. Contrary to Sahler who in 1929 described 4 cases of thrombosis delivered successfully by cesarean section in the Second Gynecological Clinic of Vienna (Kermauner) the author takes a conservative stand. Normal delivery does

not bring any particular danger of embolism. Moreover, cesarean section does not prevent embolism, even though it does spare the patient the necessity of making expulsive efforts.

(HANS HEIDLER) HAROLD C. WACE, M.D.

Naish F. C. A Study of the Immediate and Remote Effects of Pregnancy on Diseases of the Heart. *J. Obst. & Gynaec. Brit. Emp.* 1937, 44: 659.

The author's object was to discover what changes are caused by single and multiple pregnancies in patients with heart disease, not only at the time of the pregnancies but also several years after the last confinement. The material available to the author consisted of 450 patients who attended the cardiac clinic at the Royal Free Hospital between January 1934 and December 1935. The total number of pregnancies involved was 533. During the spring of 1936 a follow up of these cases was carried out and 95 (22 per cent) of the patients were again seen. It was found that pregnancy and its accompanying complications impose a burden upon the damaged heart which leads to permanent crippling. The damage is increased when the pregnancies are multiple. Too frequent pregnancies put more strain on the heart than those more widely spaced. Syncope is a symptom which indicates a guarded prognosis in cases of aortic reflux. Patients suffering from aortic stenosis do not tolerate pregnancy well. Auricular fibrillation is rare and does not occur at an early age but nevertheless it occurs at an earlier age in parous than in nulliparous women. The prognosis is poor in all cases. Complete heart block may not be a contraindication to pregnancy. Cases of bundle branch block have a poor prognosis. Hemoptysis is always a sign of congestive failure. Extrasystoles indicate an increased irritability of the affected part, but are common in normal pregnancy. In cases of mitral stenosis auricular extrasystoles may be precursors of auricular fibrillation. A follow up of 22 per cent of the patients showed that 37 per cent were worse than before their pregnancies. The patients in whom the heart was decompensated during pregnancy showed the greatest degree of permanent crippling after wards. Antenatal rest for therapeutic and routine purposes is of great value. Anesthesia requires consideration of the type of heart disease; the procedure for which the anesthetic is required and the experience of the anesthetist. HARRY W. FINK, M.D.

LABOR AND ITS COMPLICATIONS

Rhentner, Ducher and Chastel. The Test of Labor after Ten Years of Practice (*Réflexions sur l'épreuve du travail après dix années de pratique*). *Gynéc. et Obst.* 1937, 35: 5.

Rhentner and his associates report that at the *Hôpital de la Croix Rousse* of Lyons, France, there were 12,701 deliveries in the ten years from 1927 to 1936. Ninety-four per cent of the women delivered at the hospital were under careful prenatal supervision. There were 270 women with contracted

primiparas, 1 after primary, and 2 after the ordinary escape of fluid. The rest of the patients who died were febrile, 4 being primiparas with primary rupture and 2 being multiparas with primary and ordinary rupture, respectively.

Among 9,375 children, 102 were stillborn, or died within three weeks after birth, giving a mortality of 11 per cent. This low rate was due to the deliveries being of normal character. The cause of death in most cases was cerebral hemorrhage, with or without demonstrable ruptures, usually in the tentorium

LOUIS NEUWELT, M D

Wichman, S. E.: Spontaneous Rupture of the Membranes and Artificial Rupture During Labor (Blasensprung und Blasensprengung bei der Entbindung) *Acta obst et gynec. Scand*, 1937, 17 158.

The author discusses a material of 2,557 primiparas and 716 secundiparas from twenty to twenty-four years old in a study of the importance of spontaneous rupture of the membranes in parturition, also 1,307 primiparas and 1,046 secundiparas, in some of which the membranes were unruptured and in others of which the rupture occurred after internal examination, also 416 primiparas and 330 multiparas of different ages, in which the membranes were ruptured artificially. In regard to the time of the rupture of the membranes, he classifies them in four groups (1) premature, (2) early, (3) full-term, and (4) retarded rupture.

Premature escape of the fluid occurs in primiparas about equally as often as in secundiparas and multiparas, namely, in from 10 to 12 per cent of the cases in parturitions from twenty to twenty-four years old. The tendency to premature escape of the fluid possibly increases somewhat with advancing age. At premature escape of the fluid the statistically proved shortened period of painful uterine contractions in the first stage of labor, and thus the whole course of parturition in all of the cases, is largely due to the preliminary non-painful contractions during the so-called time of latency and the last period of pregnancy.

The period of dilatation was subdivided into two periods: the stage in which the pains occur irregularly and with intervals of more than ten minutes, and that in which the pains are regular and more frequent. With premature escape of the fluid parturition commenced with regular pains in about 61 per cent of the cases, with early and full-term escape of the fluid, in about 24 per cent, and with retarded escape of the fluid, in about 20 per cent. Deliveries beginning with a period of irregular pains are of longer duration than those in which the labor pains are regular from the very beginning. The latter deliveries again are longer than the period of regular pains in those cases which commence with irregular pains. It is proved by statistics and mathematics that the period of painful contractions at premature, early, full-term, and retarded escape of the fluid is undoubtedly and significantly of different length,

which characteristic applies also to the regular time of pains in cases beginning with irregular pains, and to the duration of labor in cases beginning with irregular or regular pains. Hence, the materials for study of the duration of delivery must be homogeneous not only in regard to age and parity as well as duration of gravidity, but also with a view to the aforementioned conditions. Otherwise, the results will lack in full scientific value, as the material may contain varying numbers of deliveries dissimilar in the aforementioned respects.

The operation frequency, the morbidity or mortality of mothers and infants, as well as the rate of umbilical-cord prolapse at premature escape of the fluid and artificial rupture of the membranes were not greater in primiparas nor in secundiparas than in the rest of the material. At any rate, it seems as if the bag of waters should be of a certain importance as an organ protecting the fetus in the presence of very violent labor pains, in breech presentation, and, particularly, in premature delivery. According to the author's findings the delivery appears, with a certain amount of probability, to be shortened by artificial rupture of the membranes. In a fairly small number of cases only the bag of waters seems to be of importance in dilating the cervix.

Especially in cases with a longer period of irregular pains in the first stage of labor, the thick, resistant membranes and the absence of the bag of waters seem to act absolutely as an impediment to the delivery. Artificial rupture of the membranes is justified in these not very numerous cases for promoting the process of labor and decreasing the frequency of operation, as it does not demonstrably aggravate the prognosis, and therefore is directly indicated in these cases. A schematic artificial rupturing of the membranes, in every case with the purpose of accelerating the parturition, must be rejected.

The material shows that in cases in which no internal examinations were made, or in which such were made by experts at the clinic the danger of infection does not grow in proportion to the time elapsing between the rupture of the membranes and the delivery. The danger is enhanced only if the genitalia were infected previously or by examinations made by incompetent persons.

LOUIS NEUWELT, M D.

Winter, G.: The Conversion of Deflexions (Die Umwandlung der Deflexionslagen). *Therap d Gegenw*, 1937, 78 193

The author takes a critical stand against the manual conversion of deflexion attitudes of the fetus. The prognosis for mother and child is made noticeably worse in combination with contraction of the pelvis, advanced age in primiparity, weak uterine contractions, and abnormally large infants. The children are especially endangered; the mortality rates in the literature range between 25 and 66 per cent. The manual conversion of these abnormalities of attitude first reached a certain height when Thorn taught how to correct the faulty attitude by internal

is unknown. If the degree of dilatation of the os has been ascertained by exploration at the time the fluid escapes three expressions are required for the different forms of rupture: (1) before (2) during and (3) after dilatation of the os. For this purpose the terms anticipated physiological and retarded escape of fluid, are adopted.

The author's material does not include operative deliveries nor pathological conditions, such as eclampsia, placenta previa, transverse presentation, hydramnios and twin births. He has included only normal spontaneous births in which the time of rupture of the membranes is definitely known. The child must be one of full term at between thirty-eight and forty weeks development. There were 9,375 births. Patients with two separate axillary readings of 37° C temperature and upward either on the same day or on different days were entered among the infected cases, also those with a single record of axillary temperature from 38° C upward.

Respecting the primary rupture of the membranes during labor different views are held. The question of the importance of the primary escape of fluid for the whole course of labor and especially for its duration and the risk of infection deserve further investigation. It is generally held that primary rupture of the membranes is very unfortunate, especially as it increases the risk of infection and prolongs the duration of labor. Highly varying figures from 1 to 30 per cent are given for the frequency of this occurrence. Among 9,375 births primary rupture of the membranes occurred in 13 per cent and among these it occurred in primiparas in 14.2 per cent and in multiparas in 11.7 per cent. This difference is a real one and not due to accidental circumstances. The frequency of primary rupture of the membranes rises very distinctly with age both for primiparas and multiparas except for primiparas aged forty and over.

The influence of the time of rupture of the membranes on the duration of labor is evidenced by the fact that among primiparas with labor lasting at most five hours there are twice as many deliveries after primary rupture as after ordinary rupture. More deliveries are completed within the same period after primary than after the ordinary escape of fluid. The duration of labor is therefore shorter after primary rupture of the membranes always provided that the duration is reckoned from the time the painful contractions begin. However the onset of this subjective sensation of pain varies highly and not the least so in the first stage of labor. Hence the duration of the pains is shortest after primary rupture.

The duration of the labor pains is not the same as the duration of the whole period of parturition since the latter also includes the insensible labor pains. In order to decide this question it is necessary to make vaginal examinations at the time of rupture of the membranes from which the author refrains on principle and therefore cannot decide. Vaginal examination was done before the pains be-

gan and only on strict indications in only 62 women with primary rupture. Only 11 of these cases showed no signs of any work of labor having been performed, no demonstrable dilatation of the cervical canal or os but 51 cases showed in increasing degree the results of travail insensible. The os uteri was completely dilated in 13 patients in 3 of whom the head was in the pelvic cavity and rotation was completed before the subjective pains set in. These are the so-called precipitate births. About 18 per cent of the 62 patients failed to show signs that labor had begun while about 82 per cent were already in travail insensible. Various possibilities may be responsible for the escape of fluid by primary rupture of the membranes: the membranes may be unusually fragile but probably the most important factor must be increased pressure caused by contractions of the uterine musculature. The clinical determination of the moment at which labor begins is a matter of inaccurate estimation. The author assumes that labor marked by primary rupture of the membranes should be deemed to have begun when the amniotic fluid escaped. His calculations show that primary rupture of the membranes gives a far higher mean duration for the work of parturition, not labor pains than ordinary rupture with the single exception of the febrile multiparas at the age of from twenty to twenty-four years. The author believes that it is highly probable that the shorter duration of labor after primary rupture of the membranes is in reality merely due to the fact that the 'travail insensible' is not included in computing the duration of the process. It would be a mistake to suppose that the pains of labor could be shortened by artificial rupture of the membranes.

The author's statistics show that the percentage of infection is higher after primary than after ordinary rupture in primiparas the percentages are 27.4 and 24.8 per cent respectively and in multiparas 15.6 and 12.2 per cent respectively. Hence primary escape of fluid predisposes to infection.

The usual clinical experience that the risk of infection increases with the prolongation of labor is distinctly confirmed by the author's material. The mean duration for the febrile women is considerably greater than for the afebrile with few exceptions depending on accidental factors.

In regard to the relation between infection and early rupture of the membranes more labors were completed within the same time among the afebrile women both primiparas and multiparas than among the febrile. The rupture of the membranes occurred at most ten hours before onset of pains in 65 per cent of the afebrile primiparas among the febrile primiparas more than 10 hours elapsed from the time of rupture to the beginning of the pains in 42 per cent while in 58 per cent 10 hours or less elapsed. The longer the time from the escape of the fluid to the onset of the pains the greater the risk of infection.

Among 9,375 mothers 9 deaths occurred without any causal relation to primary or ordinary rupture of the membranes. Three were those of afebrile

GENITO-URINARY SURGERY

TUBERCLE BACILLURIA, ITS INTERPRETATION BY PRESENT DAY METHODS OF INVESTIGATION

Collective Review

DANIEL N. EISENDRATH, M.D., F A C S , Paris, France

THE presence of tubercle bacilli in the bladder urine or in that obtained directly by catheterization from the kidney has until recently been regarded as the strongest link in the chain of evidence upon which a diagnosis of urogenital tuberculosis has been made.

A constantly growing wave of skepticism as to whether this was true for all cases in which tubercle bacilli were found in the bladder or ureteral urine began in 1901 with the publication of a paper by Foulerton and Hillier (10), which will be referred to later.

Since that time a very active discussion has taken place between the supporters of such a contention, those who maintain that a true tubercle bacilluria exists without specific renal or genital lesions, and the opponents, who claim that tubercle bacilli in the bladder or ureteral urine always signify the existence of a tuberculous focus in the kidney or male genitalia.

Dimitza and St Kartal (7) in a review of the literature up to 1932 stated that it is essential to define what is meant by true tubercle bacilluria. This condition is the passage of tubercle bacilli, (1) through an entirely normal kidney in a case of extrarenal tuberculosis, (2) through a kidney which has been damaged from any cause whatsoever, or (3) through a kidney showing the changes ascribed to tuberculous nephritis¹

According to Dimitza and St Kartal, in order to fulfill these three possibilities the following conditions must exist:

1. The bacilli must have been found in the urine not only in smears of the centrifuged sediment, but also by the culture and animal inoculation methods
2. One must be sure, in employing every modern urological diagnostic resource, that the bacilli really come from the kidneys
3. The possibility that the bacilli have their origin in the male genitalia must be excluded

¹This term has been first applied by Wildbolz (17) to cases in which tubercle bacilli are found in the urine, but the kidney on histological study reveals only non-specific inflammatory changes. His papers on the subject will be discussed later

4. A complete histological and bacteriological examination of the kidneys must have been made so as to exclude even minute tuberculous foci

ARTICLES WHICH SUPPORT THE THEORY OF TUBERCLE BACILLURIA WITHOUT TUBERCULOUS UROGENITAL LESIONS

Foulerton and Hillier (10) inoculated from 2 to 8 guinea pigs on different days with the urine of 18 patients suffering from pulmonary tuberculosis. Positive results were obtained in 9 of the 18 cases. Necropsy on 6 of the 9 failed to reveal any "tuberculosis of the urinary tract."

The other 3 of the 9 positive cases were not followed. No report is made of any histological examination of the kidneys in the 6 cases which came to necropsy. No mention is made of the condition of the genitalia in the 2 male patients.

Jousset (15) failed to find any specific tissue changes at necropsy in the kidneys of 15 patients with pulmonary tuberculosis whose urine had been positive. However, a few tubercle bacilli were seen in sections of the kidneys

In order to absolutely exclude the presence of tuberculous lesions, serial sections of an entire kidney or at least of the most suspicious areas as shown by Lieberthal and von Huth, as well as by Dimitza and Schaffhauser, must be made. Again, no guinea-pig inoculations or cultures were made of the kidney tissue in any of Jousset's cases.

Rolly (33) examined at necropsy the kidneys of 21 patients with pulmonary tuberculosis, but failed to find any gross lesions indicative of tuberculous infection. He believed that the action of the tuberculotoxin so damaged the kidney as to permit the passage of tubercle bacilli into the urine

Neither a histological nor a bacteriological examination was made of any of the kidneys.

Liebermeister (18) obtained positive guinea-pig results following the inoculation of kidney tissue from patients with pulmonary tuberculosis whose blood cultures had also been positive for tubercle bacilli.

and external manipulations involving three points, the head breech and chest. This procedure succeeds only in the hands of the exceptionally skillful and even they succeed only from the standpoint of mechanism of labor.

Mothers and children, even after successful conversion, are greatly endangered. This procedure as a whole gives a maternal mortality of 3 per cent and a fetal mortality of from 20 to 25 per cent. Even version and extraction have not reduced the fetal mortality. Very good results on the other hand, are obtained from the skillfully performed cesarean section carried out at the proper time and under aseptic precautions. This was shown in Winter's statistics of 1928. The good results of cesarean section, however, do not warrant the conclusion that this is the procedure of choice in all or even the majority of deflexion anomalies. Boers showed us that the fact that 96 per cent of the face presentations and at least 50 per cent of the brow presentations deliver spontaneously must be taken into consideration more carefully. The indications for cesarean section in face presentation are found when the following conditions exist: elderly primiparas; an abnormally large child; contracted pelvis; and persistent mentum posterior, in brow presentations the same indications hold. The manual conversion of deflexion anomalies is however a thing of the past.

(H. Fuchs) HAROLD C. MACE, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Müller N. F. and Brown W. The Surgical Treatment of Complete Perineal Tears in the Female. *Am J Obst & Gynec*, 1937, 34, 196.

This study is based on 182 chronic complete tears of the perineum. Acute tears are not included. The cases studied were divided into two groups. Group 1 comprised 144 patients operated upon by various methods prior to the year of 1931 and Group 2 comprised 38 patients operated upon since the year of 1931 by the paradoxical operation.

The operative techniques used for the cases in Group 1 are difficult to name because of their general similarity; fundamentally they consisted of the flap operation combined with subcutaneous cutting of the sphincter in the posterior quadrant. The operation is described. The results obtained in the 182 cases were as follows:

	Group 1 Per cent	Group 2 Per cent
Function restored	71	87
Function improved	15	8
Failure	10	5
Unknown	4	0

EDWARD L. CORNELL, M.D.

Vignali A. Osteomyelo Arthritis of the Symphysis Pubis from Puerperal Infection (Osteo mieloartriti della sinfisi pubica da infezione puerperale). *Arch di ostet e ginec* 1937 15, 27.

The author presents the records with radiographs of two patients with this rare pathological condition. The first, aged nineteen years, underwent a normal labor at term. On the fourth day of the puerperium there was a chill followed by fever. The next day she was seen by the author who noted no clinical changes. Low grade fever continued. On the twelfth puerperal day there was pain over the symphysis pubis. On examination the entire region of the symphysis was tender but other parts of the pelvis were normal. On the twenty first puerperal day a x-ray examination revealed considerable destruction of the pubic bones and the symphysis pubis. A series of radiographs are shown and described in detail in the original article. Incision of the abscess was performed about ten weeks after the onset of the fever.

In the second patient the onset of a similar condition was somewhat more acute and marked by great swelling over the symphysis pubis. Several radiographs of this patient are also shown.

Both patients presented an unusual localization of a puerperal infection. In both the principle manifestations were the destruction of both pubes and the intervening cartilage. The development of the process was rather chronic and in neither patient were there any signs indicating the presence of infection elsewhere.

The author believes that the probable portal of entry for the infecting organism was some lesion or tear about the genitalia. After such entry its spread was probably hematogenous as shown by the lack of contiguous inflammation in the soft tissues of the pelvis in both patients studied.

The treatment in both of these patients consisted of surgical drainage of the abscesses.

A. LOUIS ROSE, M.D.

had been carried out for the cure of the pulmonary condition, and the positive culture was obtained from the urine of the day following the operation.

In 4 of the 12 positive culture cases the necropsy failed to reveal any evidence of tuberculosis on histological study of the kidneys. In his most recent study (6), Deist¹ emphasized the necessity of using large amounts of urine, twenty-four-hour specimens, in searching for tubercle bacilli in cases of extra-urinary tuberculosis. The urine should be examined daily for weeks at a time. Eight cases were reported in this 1933 article to prove that true tubercle bacilluria can exist. In 7 of the 8 cases there was an advanced pulmonary tuberculosis which was the immediate cause of death. Tubercle bacilli were found in the urine from one to three times in 4 patients and in 2 on several examinations. The specific character of the bacilli in the first 4 cases was confirmed by guinea-pig inoculations. In all 7 cases gross and histological examinations of the kidneys failed to reveal any tuberculous lesions. In Case 8, that of a boy thirteen years old, in spite of a bullous edema of the right ureteral orifice, diminished renal function, and tubercle bacilli in smears of the urine of that side, the kidney at operation presented only a calculus, but no evidence of tuberculous lesions.

ARTICLES WHICH OPPOSE THE THEORY OF TUBERCLE BACILLURIA WITHOUT TUBERCULOUS UROGENITAL LESIONS

In a first series of experiments, Medlar and Sasano (24) studied the question of whether tubercle bacilli could be found in the urine and kidney tissue of guinea pigs inoculated with the urine of rabbits previously inoculated with the human type of tubercle bacillus. They obtained only negative results. In a second series, 8 of 16 guinea pigs inoculated with the positive (for tubercle bacilli) urinary sediment of guinea pigs dying from a generalized miliary tuberculosis showed on histological study a bilateral renal tuberculosis, which would have been overlooked if serial sections had not been made. No healed lesions were found.

Medlar and Sasano concluded from these experiments that the presence of tubercle bacilli in the urine signifies the existence of a renal focus if tuberculosis of the genitalia can be excluded.

In a second article (23), published in 1926, Medlar reports his study of kidneys from necropsies of patients who had suffered from active pulmonary tuberculosis. About 10,000 sections of

the kidneys were made of 30 cases. Definite tuberculous lesions were found in 22 of the 30.

Medlar was of the opinion that "excretory bacilluria does not exist without ulcerative tuberculous lesions in the kidney. That these lesions are often microscopic and are often overlooked is in all probability the reason for the belief in excretory bacilluria." Such lesions may involve only part of the glomerulus. The work of Medlar has been confirmed recently (2) by David Band of Edinburgh. These articles constitute an important milestone in the solution of the question of whether tubercle bacilluria can exist without renal foci.

Spitzer and Williams (36) inoculated 103 guinea pigs with the urine of an equal number of patients with renal tuberculosis. None of the animals presented any tuberculous lesions on gross examination of the kidneys. The absence of serial section study and of reinoculation of the kidney tissue renders this investigation of comparatively little value.

Rado and von Huth (30) emphasize the necessity of obtaining the urine by ureteral catheterization in order to exclude contamination from a genital focus. They doubt the claim of Zimmermann and of Dosza that the kidney is more prone to permit the excretion of tubercle bacilli during pregnancy. Wildbolz (38) in an article published in 1929 stated that the presence of tubercle bacilli in the ureteral urine might be due to a fibrotic type of renal tuberculosis, in which neither tubercles nor caseous foci are found. He termed these cases in which only a non-specific lymphocytic infiltration is found tuberculous nephritis. In the discussion of this paper, Medlar again expressed his opinion that tubercle bacilluria is found only when ulcerative lesions are present. A renal tuberculosis of hematogenous origin was always bilateral and was cortical in three-fourths of the cases, a single giant cell often being the only trace of a lesion.

R. I. Harris (13) inoculated guinea pigs with the urine from 110 patients with extra-urogenital surgical tuberculosis a number of times during a period of from eighteen to twenty-four months. Positive results were either constantly or intermittently obtained in 16 (37 per cent) of 43 adults and 9 (13.8 per cent) of 67 children. Tubercle bacilli were found in the ureteral urine of 12 of these 25 patients. Including 1 case in which necropsy revealed the presence of renal tuberculosis, and 2 in which cystoscopy was impossible, but in which a diagnosis could be made from the bladder and ureteral orifice findings, the renal origin of the bacilli was proved in 15 of

¹At the 1917 meeting of the German Tuberculosis Society, Deist still maintained that "under certain conditions, the bacilli can pass through the kidney without producing any clinically tangible results."

He found tubercle bacilli also in the blood of these patients, so that it is possible that the positive inoculation results might have been from bacilli in the blood vessels of the kidney.

Luedke and Sturm (21) found that the urine of 85 patients with pulmonary tuberculosis, when inoculated into guinea pigs, yielded positive results in 11 cases.

None of the 11 cases was examined by a urologist, and no mention is made in the necropsy reports of the condition of the urinary tract or the genitalia in the male patients.

Kielluthner (17) reported two series of clinical and necropsy observations on cases of pulmonary tuberculosis. In Series A there were 19 patients. Examination of the urine failed to reveal the presence of albumin. All animal inoculations of the urine were negative. Thirteen of the 19 came to necropsy, but no urogenital tuberculous lesions were found. In Series B there were 3 patients. Examination of the urine revealed albuminuria. Smears and animal inoculations with the urinary sediment were positive in all of the 3 cases.

No gross changes in the kidneys were found at necropsy, but histological study revealed areas of small round celled infiltration in two of the cases but no changes of a specific tuberculous type.

Kielluthner maintained that these findings justified the assumption that tubercle bacilli can pass through a damaged kidney as shown by the existence of albuminuria.

None of the methods, which are to be enumerated later under 'Opponents of bacilluria' were employed to ascertain the presence of tuberculous lesions in any of the kidneys of Series B.

Wildbolz (37) reported a case of nephrolithiasis in which the urine gave a positive result on animal inoculation but the kidney following removal failed to show any tuberculous changes.

No evidence was presented that all of the present requirements to exclude renal tuberculosis were observed, as in Kielluthner's 3 cases.

Hobbs (14) inoculated guinea pigs with the urine from 100 patients with pulmonary tuberculosis with positive results in 6 of the 100. Necropsy in 1 of the 6 cases revealed the presence of renal tuberculosis.

The histological examination of the kidneys in none of the necropsy cases can be considered as having been adequate in view of present requirements.

Noyes (28) inoculated guinea pigs with the urine from 13 women patients with pulmonary tuberculosis. Positive results were obtained in every case, but no tuberculosis was found at necropsy on gross examination of the kidneys.

One does not find any mention of a histological study of these kidneys.

Von Rühmer (32) reported 2 cases in which acid fast bacilli were found in smears of the urinary sediment. In 1 of these the guinea pig inoculation was negative. Examination of the kidney in each case, following nephrectomy, failed to reveal any gross or histological changes indicative of tuberculosis. Von Rühmer believes that even when the guinea pig inoculation is positive, it does not always indicate renal tuberculosis. He maintained that tubercle bacilluria can exist without a specific renal lesion.

As will be shown later, not all acid fast bacilli found in smears are tubercle bacilli. No renal sections were made of the two kidneys and inoculation of some of the tissue into guinea pigs was not carried out.

Menton (25) inoculated guinea pigs with the urine of 76 patients with pulmonary tuberculosis whose sputum had been positive for tubercle bacilli. The guinea pigs were killed after six weeks. Only one guinea pig inoculation was found to be positive and this on three occasions.

This single patient was not examined by a urologist and has not been followed over a sufficiently long period to warrant the exclusion of the presence of urogenital tuberculosis.

Deist has made a number of contributions to the subject of tubercle bacilluria. In his 1919 article (4) he reported a case of a woman aged thirty years with pulmonary and intestinal tuberculosis in whom a diagnosis of renal tuberculosis had also been made. Although many red blood cells, leucocytes and tubercle bacilli had been found in the urine the urinary symptoms and findings disappeared as soon as the patient's general condition improved. The patient had been kept under observation for four years. Deist maintained that in such cases histological changes took place in the kidney in the form of lymphocytic infiltration and sclerosis and that often but not invariably, one could find giant cells as an indication of a transition stage to tuberculosis. Deist regarded his case as one of tuberculous nephritis, a type of infection by tubercle bacilli but without specific changes, which will be referred to later.

In a second paper (5) Deist reported 31 cases of pulmonary tuberculosis in which search was made for tubercle bacilli in the urine by the culture method daily for twenty five days. The culture was positive in 12 of these 31 cases. The sputum was positive in all of these 12, but there were no symptoms referable to the urinary tract. In these 12 patients various surgical procedures

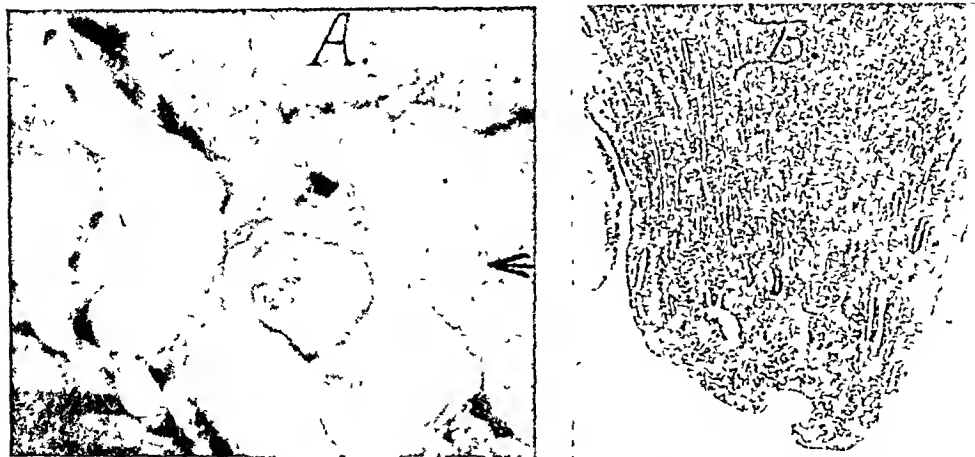


Fig 1 Gross and histological lesions in Case 2 of Dimtza and Schaffhauser A Incipient ulcerative tuberculous lesion of papilla as seen with aid of a magnifying glass B. Microphotograph of same lesion Very early lesion with tiny ulcer and numerous giant cells¹

through the tubules of the papillæ does not appear probable, as was shown experimentally by Pels-Leusden. In 2 of the authors' cases the oldest changes were at the place (Figs 1, 2, and 3) where the pelvis makes a fold or niche near the base of the pyramid. The more recent changes were in the pelvic mucosa and at the tip of a papilla.

Wildbolz bases his diagnosis of renal tuberculosis upon the triad: bacilluria, pyuria, and diminution of function. In the 8 cases reported by Dimtza and Schaffhauser there were only a slight decrease in function and only from 3 to 5 leucocytes per high power field. Tubercle bacilli were found only after prolonged observation and repeated search.

The cardinal finding is the presence of tubercle bacilli in the urine of the suspected kidney, therefore, bilateral ureteral catheterization is indispensable. Culture and animal inoculation give positive results more frequently than staining methods. In 4 cases a few bacilli were found early by the direct or staining method after many examinations. In the other 4 cases, the stain was not positive until a long time after the culture and animal inoculation had been positive. As a culture medium, that of Loewenstein was used, and for the guinea-pig test, the intraglandular method of Knorr.

The urine may be normal even when bacilli are found. The diminution in function in the 8 cases was so slight as to be negligible.

In conclusion, the authors emphasize the ne-

cessity of repeated and careful examinations of the kidney and genitalia in cases of bacilluria. One should be extremely cautious before making the diagnosis of true tubercle bacilluria.

Bader (1), in 1932, found tubercle bacilli in smears of the urine of 5 of 100 cases of advanced pulmonary tuberculosis. The cultures and guinea-pig inoculations were both positive in 4 of the 5. Evidence of urogenital tuberculosis was found in the 5 cases with positive urine. Bader is of the opinion that a tubercle bacilluria always signifies the presence of urogenital tuberculosis.

McKenna and Sweany (22), in 1932, made serial sections every 5 or 6 mm of both kidneys from 103 male and 71 female patients, who died of advanced pulmonary tuberculosis. They found tuberculous lesions in 10.3 per cent of the kidneys from the male, and in 8.8 per cent of the kidneys from the female, patients. The foci were miliary, bilateral, and inoperable in most of the kidneys. In some cases, only one kidney was involved by a disseminated large nodular form of the condition which was also inoperable. The authors believe that operable lesions will be found more often in patients with extrapulmonary lesions or in those with minor foci in the lungs.

Lieberthal and von Huth, in their 1933 article (19), reported the examination of 240 tuberculous kidneys, 80 of which were obtained at autopsy. Every calyx of a pelvis was exposed to its termination. Seven kidneys are described in detail in order to show how easily tuberculous lesions may be overlooked unless the papillæ and calyces are inspected systematically. Even experienced pathologists will overlook small tuberculous ulcers

¹Figures 1, 2, and 3 are from article by Dimtza and Schaffhauser in *Ztschr. f. urol. Chir.*, 1932, 35: 417.

the 25 cases with positive urine. Cystoscopy was not done in 4 cases. In 6 of the 16 adults, there were associated genital lesions. The renal origin of the bacilli failed to be proved in only 1 adult. In 3 adults, renal tuberculosis was found at necropsy. The renal origin of the bacilli was proved in 5 of the 9 children and a sixth died of tuberculous meningitis.

✓ Harris emphasizes the necessity of a complete urological examination before a diagnosis of tubercle bacilluria without specific renal or genital lesions, or both, is made.

Groeninger and Pesch (12) made cultures and guinea pig inoculations every two days of the urine of 19 female patients with advanced pulmonary tuberculosis. A search for tubercle bacilli in the urine was made by the culture and guinea pig inoculation methods. There were two positive results. In 1 of the 2 patients a diagnosis of renal tuberculosis was made following a urological examination. The patient died soon afterward as the result of the pulmonary condition. The necropsy showed advanced right renal tuberculosis. In the other patient chronic trigonal cystitis was found upon cystoscopy. The urine from the left kidney was negative in the smear but the guinea pig test was positive. This patient died nine months later. At necropsy, an early tuberculous lesion of the left kidney was found.

In their first series of experiments, Lieberthal and von Huth (20) injected tubercle bacilli into 14 rabbits and then studied cultures and smears of the twenty four hour urine over a period of twenty days which gave uniformly negative results. In a second series, the urine of 8 rabbits in which an experimental nephritis or nephrosis had been produced and was followed by the injection of tubercle bacilli, proved to be negative in culture and smear examination over a period of twenty days. Careful histological examination also failed to reveal the presence of bacilli in the kidneys in both series. These authors were of the opinion that tubercle bacilli do not pass through the kidneys of animals under any circumstances. Infection takes place only if there are local circulatory changes or if the bacilli are sufficient in number to cause emboli.

Dimitza and Schaffhauser (8) studied the question in 175 cases of extragenito-urinary surgical tuberculosis. They cited cases which disprove the contention of Kelleuthner and Wildholz referred to previously, that chronic inflammatory changes in the kidney favor passage of tubercle bacilli.

They emphasized as had also Harris, that a complete urological examination should be made in every case in which tubercle bacilli are found

in the urine. The urine of the 175 patients was examined every four or five weeks by the three methods: smear, culture, and guinea pig inoculation. Tubercle bacilli were found in the urine in 8 of the 175 cases. In 7 there were no symptoms referable to the urinary tract. Five of the 7 had bone foci, 1 had been operated upon for tuberculous epididymitis and 1 had involvement of the pleura. Urological study in these 8 cases revealed uniformly a primary renal tuberculosis which was confirmed by operation.

As a result of their observations, the authors find that in early cases of renal tuberculosis one may have positive results only when cultures and animal inoculations are made. There may be only from 2 to 5 leucocytes per high power, a complete absence of albumin, and only a slight diminution of function.

Hence, in all cases (a) in which the urine is positive for tubercle bacilli as shown by culture and animal inoculation, and (b) in which there are few leucocytes, from 3 to 5, an absence of albumin, and only minimal functional disturbance, a microscopic examination of the kidney will always show an incipient, chronic caseo-cavernous tuberculosis.

The authors were never able to find true bacilluria, therefore, one should be very reserved in making such a diagnosis. A single positive finding in examination of the urine, or a short period of observation of such a case do not suffice for this diagnosis, unless the microscopic and bacteriological study of the kidney fails to reveal tuberculosis. Intracapsular or subcapsular foci in the pyramids can simulate bacilluria for a long time. Only prolonged observation and frequent controls will permit the diagnosis of true renal tuberculosis to be made.

The authors are very skeptical in regard to the existence of tuberculous nephritis. No changes of this nature were found on microscopic examination.

In the examination of a kidney, especial attention should be paid to the papillae and the calyces (Figs 1, 2 and 3) of the calyces. In some cases only serial sections will reveal a tuberculous lesion. The primary localization in the 8 early cases observed by the authors was almost always in the pyramids. In 4 of the 8 cases, the lateral portions of the papillae were first involved. In case 8, the focus in this location was still sub-epithelial; that is, it had not yet caused an ulceration of the overlying mucosa.

The bacilli are carried directly as bacterial emboli by way of the blood vessels to the area where the focus develops. An excretory invasion

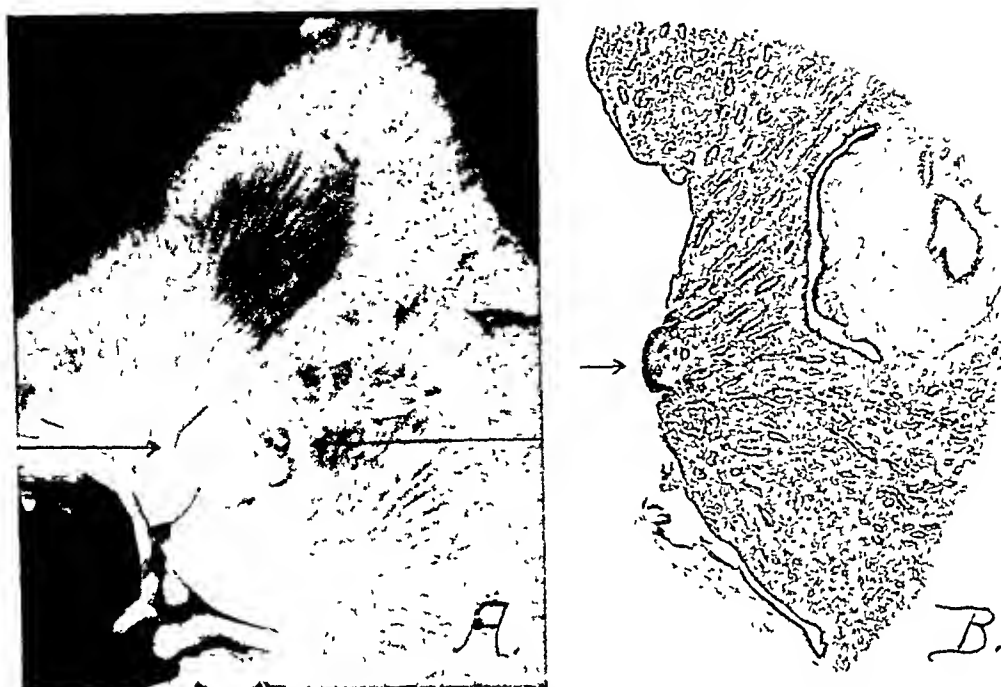


Fig 3 Gross and histological lesions in Case 8 of Dimitza and Schaffhauser A Gross appearance (with aid of magnifying glass) of pin-head sized non-caseated granulation area of a papilla (arrow on right points to area better than arrow on left) This lesion was the only one found in the kidney B Microphotograph of same lesion Arrow points to the pin-head sized subepithelial non-caseated granulation area, the only tuberculous lesion in the kidney

of this group, evidence of renal tuberculosis appeared ten and twelve months later, respectively

3. Patients in whom the tubercle bacilluria appears to be part of a terminal process. The majority of the patients belong in this group.

Saenz, Eisendrath, Costil and Sadettin, (34) reported a study of the urine of 100 patients with pulmonary tuberculosis. The diagnosis had been confirmed in all by radiography. There were no clinical signs of urogenital disease in any of them. In a first series of 25 adults and 25 children both the smears and cultures of the spontaneously voided urine were uniformly negative.

In a second series of 50 adults, 25 males and 25 females, also with active pulmonary lesions confirmed by radiography, the urine was found negative by the smear and culture methods.

Gaiginsky and Petresco (11) reported two series of 43 experiments similar to those of Lieberthal and von Huth, previously cited, to demonstrate that tubercle bacilli are not excreted by the kidneys when injected into guinea pigs.

The urine of 43 guinea pigs which had been inoculated with the bovine type of tubercle bacil-

lus was obtained at necropsy of the animals, all of which had died of generalized lesions. The urine, examined by both the culture and reinoculation of guinea pig methods, was found uniformly negative.

Coulaud (3) studied the histological changes in 1,200 rabbits injected with cultures of tubercle bacilli. His conclusions were as follows:

1. The initial lesions are always cortical, and their natural tendency is toward spontaneous recovery as the result of fibrotic changes.

2. Medullary lesions follow the cortical, being found beneath the epithelial lining of the renal pelvis covering the papillae and at the niches. Fibrosis of the medullary lesions was observed in only 7 of the 1,200 rabbits.

The bilaterality of rabbit and human lesions is explicable by invasion of both kidneys simultaneously by the arterial route.

Coulaud's study amply confirms the observations of Medlar and of Band.

Wyler (40) injected a virulent culture of the bovine type of tubercle bacillus into the renal artery of one of the two kidneys of rabbits and



Fig 2 Microphotograph from Case 6 of Dumitza and Schaffhauser. Primary subcortical lesion in pyramid with epitheloid-cell focus and streaky infiltration (round celled) of papilla.

on the surface of the papilla because the individual calyces are not followed to their termination. Serial sections need be made only of areas of the mucosa covering the papilla which show a greyish discoloration or minute erosions. Ulcerations are often so minute that they cannot be seen without the aid of a magnifying glass. Tubercle bacilli were never found in the renal parenchyma, tubules, or in the ordinary non-caseated lesions. In several thousand sections stained by the Ziehl-Neelsen method for tubercle bacilli the bacilli were found only (a) in the centers of ulcers on the mucosa of the papilla, calyces, ureter and bladder, and (b) in the walls or contents of cavities filled with caseous detritus. From a clinical point of view renal tuberculosis is unilateral, but from that of pathology it is bilateral. The lesion in the second kidney is often so small as to be overlooked at autopsy. The tubercle bacillus and its toxins do not give rise to a non-specific nephritis as Wildbolz, Fain and a few others maintain. A nephrosis may develop as the result of pulmonary tuberculosis. Glomerulonephritis may develop from secondary streptococcal infection of the tuberculous pulmonary cavities.

In incipient ulcerative renal tuberculosis, the urine examination from the kidney involved may fail to reveal the presence of any pus cells; the functional tests may not show any deviation from

the normal, and the bladder also may present a normal appearance. The authors believe that such early lesions may heal occasionally and are responsible for a transitory tubercle bacilluria. A case reported by Dosza in 1932 corroborates the opinion of the authors just quoted that a pyuria and loss of function can both be lacking in renal tuberculosis. In Dosza's case (9) the patient had noticed hematuria six months before admission to the hospital. There was an edema of the left ureteral orifice and a tiny ulcer above it. Tubercle bacilli were found in the urine of that side. Excretory urography revealed irregular scattered shadows over the corresponding kidney region. The left kidney after removal presented a retracted area near the middle of the convexity where two tubercles and a pea-sized caseated focus were found. There was also an ulceration on one of the papillae of the lower calyx.

Band (2) found the urine positive for tubercle bacilli in 25 (54.4 per cent) of 274 cases of extragenito-urinary tuberculosis which was chiefly pulmonary, and pyuria was present in all of the 25 cases. The bacilluria was a terminal feature in 10 of the 25 cases in which the patient died. Two other cases presented typical clinical evidence, including urographic changes, only after an interval of two years. In 5 patients the kidneys at autopsy failed to show any gross lesions but on histological examination serial sections revealed bilateral, chiefly cortical, tuberculous foci in all of the 5 patients, a confirmation of Medlar's experimental work. Band found many minute foci which had apparently healed. He believes that the presence of tubercle bacilli in the urine means a focus in the kidney, but that early lesions may remain closed, thus becoming encysted and failing to discharge infected debris into the tubules. As a rule, caseating foci ultimately ulcerate into the tubules and lead to a clinically demonstrable renal tuberculosis.

Munro (27) examined the urine of 160 patients with pulmonary tuberculosis by the guinea pig inoculation method and that of 60 of the 160 patients by both the inoculation and the culture methods. The urine was positive in 27 of the 160 patients. The author divided the patients into three groups as follows:

1. Patients who ceased to have tubercle bacilli and pus cells in the urine. Munro believes that in 4 of the 5 clinically recovered from the extragenito-urinary tuberculosis, a cortical focus had been walled off by fibrous changes as shown by Band.

2. Patients with symptoms referable to the urinary tract which appear later. In 2 patients

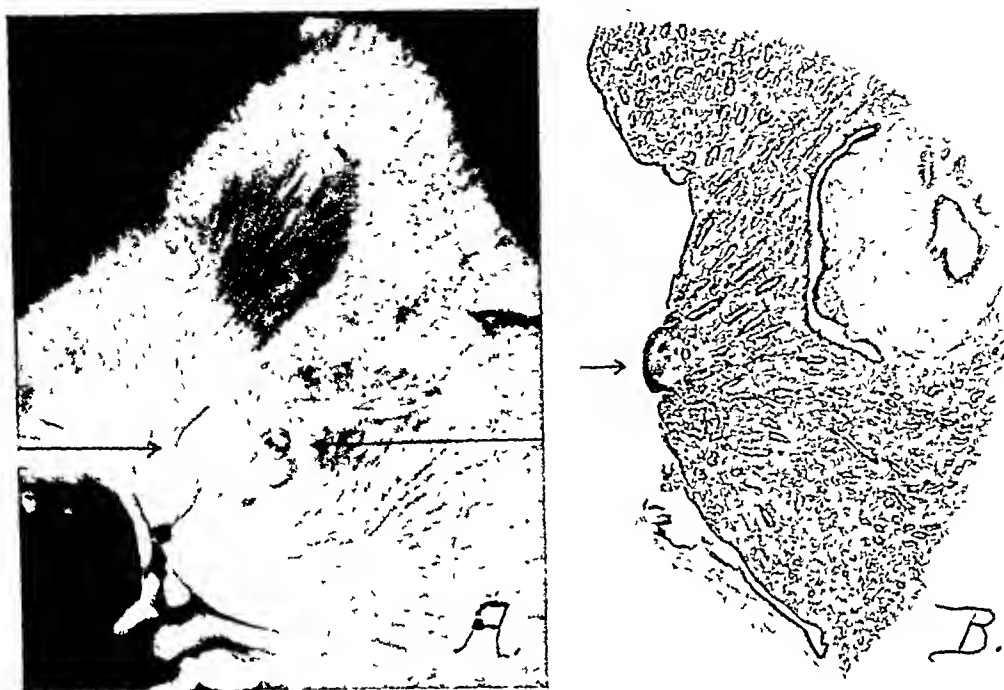


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Wyler (40) injected a virulent culture of the bovine type of tubercle bacillus into the renal artery of one of the two kidneys of rabbits and

examined the urine, obtained by catheterization, at intervals of ninety minutes, twenty four and seventy two hours by the smear, culture, and guinea pig methods. Both the urine examined two hours before the injection and that obtained at the stated periods after the injection were negative.

Wyler believes that it is impossible to produce a tubercle bacilluria experimentally.

In 51 children with extragenito-urinary tuberculous lesions Pezza (29) found the urine to be positive in only 2 cases on repeated examination by the smear and culture methods. At necropsy of both of the positive cases, only "enlarged kidneys with degenerative changes" were reported. This does not seem like an adequate examination of the kidney in view of our present knowledge of how to look for tuberculous lesions in cases of tubercle bacilluria.

In a recent review by Kallós (16) of the subject from the standpoint of the bacteriologist, the criteria upon which a decision should be based as to whether a true tubercle bacilluria exists are the following:

1. Every known method of examination must have been employed to show that the kidney is normal in function and free from pathological changes.

2. Only ureteral urine in which tubercle bacilli were found can be taken into consideration so as to exclude genital tuberculosis.

3. A single method of examination does not suffice. The smear, culture, and animal inoculation methods should all be used, because if the acid fast bacilli found in the urine are non-pathogenic for guinea pigs, rabbits, and fowl, they are acid fast saprophytes. The method used by Bothe and other investigators for obtaining urine from the bladder of tuberculous guinea pigs after death by sterile means, which is not approved by Deist (4, 5, and 6), is the only means of securing such specimens. A single virulent bacillus in such a urine suffices to give a positive result in guinea pigs when reinoculated.

Kjelleuthner's observations do not justify his assumption that tubercle bacilli can pass through a normal kidney according to Kallós.

In a critical analysis of the cases reported by Deist (4, 5 and 6) which were cited previously, Kallós states that 3 of the 4 female patients had severe intestinal tuberculosis as a complication of pulmonary tuberculous lesions. How can one be sure that the urine was not contaminated during catheterization of the patient (as Deist insists upon in females) by intestinal contents containing tubercle bacilli? Another criticism is that in

Deist's cases, in which no tuberculous lesions were found on histological study of the kidneys, no serial sections were made, none of the tissue was stained for tubercle bacilli, and none inoculated into guinea pigs.

Montgomery and Allen (26) injected a series of animals intravenously, with cultures of acid fast bacilli to ascertain whether they would be excreted by the kidneys. They employed the avian type of tubercle bacilli for guinea pigs and another type of acid fast bacilli for rabbits. Positive cultures were obtained in 2 guinea pigs and 1 rabbit. When double the number of bacilli were injected, negative results were obtained in rabbits, but positive results in 82 per cent of the guinea pigs. They believe that these positive results are due to contamination of the urine by bacilli circulating in the blood and escaping through the abrasions incident to catheterization of the animals to obtain the urine specimens. They conclude that the normal kidney of the rabbit and guinea pig is not permeable to acid fast bacilli even when there is a marked and continuous bacilemia.

R. Rieder (31) inoculated 143 guinea pigs with the urine of 136 patients with pulmonary tuberculosis. One hundred and thirty two of the animals gave negative, and 11 positive, results. In all of the latter, evidence of genito-urinary tuberculosis could be found clinically. In the cases of 16 of the 132 animals giving negative results the corresponding patients had advanced pulmonary lesions and marked albuminuria.

Before attempting to sum up the evidence in favor of and against true tubercle bacilluria it is necessary to discuss briefly the question of whether renal tuberculosis can heal spontaneously or not. The work of Medlar, Band, and of Coulaud cited above, based on observations in inoculated animals and on kidneys obtained at necropsy establishes beyond a doubt that minute cortical foci can heal spontaneously as the result of fibrotic changes. In the majority of cases, such lesions were bilateral and could not be detected clinically; therefore they are of little interest in the discussion of (1) whether true tubercle bacilluria can exist without demonstrable lesions and (2) whether a caseous focus which is the one that interests the urologist clinically, can heal spontaneously.

Of recent contributions to the second of these two questions, that is spontaneous healing of the caseous form of renal tuberculosis the following are of interest.

In the first, by Seel (35) published in 1931, 3 cases which had been operated upon for renal

tuberculosis showed that the condition may remain latent for many years. A diagnosis, based on clinical and bacteriological evidence, had been made forty, twenty-eight and nine years, respectively, before operation.

Young (41) reported the removal of a kidney seven years after tubercle bacilli had been found in the ureteral urine. The tuberculous lesion at the time of the nephrectomy was still small.

Wildbolz (39) states that only 2 proven cases of non-operative healing of the caseous type of renal tuberculosis have ever been reported. The non-caseating forms, tuberculous nephritis, appear to offer better prospects for spontaneous healing, but they cannot be distinguished from the caseous form in the majority of the cases.

DISCUSSION

The term tubercle bacilluria may be defined as the presence of tubercle bacilli in the urine of patients whose kidneys fail to reveal any specific tuberculous changes on gross, histological, and bacteriological examination. In looking over the articles on tubercle bacilluria, one finds a number in which the belief is expressed that such a condition can occur as a clinical entity. According to the supporters of the theory of a true tubercle bacilluria, the bacilli must have passed either through a normal kidney, or one damaged from any non-tuberculous cause whatsoever, as Kielleuthner (17) claims, or, finally, through a kidney showing non-specific tuberculous changes, as Wildbolz (37) maintains. Those who oppose the existence of a tubercle bacilluria without specific tuberculous renal lesions demand that the following criteria be fulfilled before a given clinical case is declared to be one of tubercle bacilluria:

1. Every known method must have been employed to show that the kidney is normal in function and free from pathological changes

2. Not only must the urine which is to be examined be collected by ureteral catheterization, but the presence of genital tuberculosis in the male or the discharge of a perivesical tuberculous focus, in the female, into the bladder must be excluded

3. A single method of examination does not suffice. The smear, culture, and animal inoculation methods must all be used because if the acid-fast bacilli found in the urine are non-pathogenic for guinea pigs, rabbits, and fowl, they are acid-fast saprophytes

4. Every case must have been subjected to a complete urological study, including excretory and, if possible, ascending or retrograde urography

5. Gross inspection of the kidney for minute foci should be carried out according to the technique described by Dimtza and Schaffhauser (8) and by Lieberthal and von Huth (19). The histological study must include serial sections of suspected tuberculous areas. The kidney tissue obtained at necropsy must give negative results by the smear, culture, and animal-inoculation methods before the presence of a renal tuberculosis can be excluded.

It is evident that if these criteria are applied to the claim made by the supporters of the theory that tubercle bacilli can be found in the urine without specific renal lesions, proof of their contention is lacking

The histological examinations of the kidneys by both Medlar (23) and Band (2) in cases of pulmonary tuberculosis show that tuberculous lesions are to be found in a certain number, if the serial section method is employed. The tubercles are usually bilateral, cortical, and so small that they do not give rise to clinically demonstrable findings. Such lesions have been shown by both of these authors, to become fibrosed and heal spontaneously. This raises the question as to whether caseating foci can heal also. This would mean that there are clinical cases in which tubercle bacilli were found in the urine on one or several occasions, a genital source being excluded, and then were absent over a period of one or more years, which findings would justify the conclusion that a caseous focus had existed but had healed. This viewpoint is expressed by Harris (13), by Band (2), and others to explain the absence of the bacilli on later examinations. The chief argument against such a claim is that in many cases of renal tuberculosis not only is the evolution of the lesions subject to great variation in respect to time, but a focus of infection may become temporarily or permanently occluded and yet the destructive process go on. Three cases reported by Seel (35) and 1 by Young (41) were cited to show the slow development of the clinical pictures in some cases. Wildbolz (39), who has had the largest individual experience with renal tuberculosis, maintains that only 2 proved cases of spontaneous recovery have ever been published. This shows that observation extending over many years is necessary before a case of renal tuberculosis can be considered as healed.

It is at once apparent that there is an inseparable relation between tubercle bacilluria without a demonstrable clinical lesion and the question of spontaneous recovery.

Harris (13) as well as Dimtza and Schaffhauser (8) have shown that when tubercle bacilli are

found in the urine of patients suffering from joint, bone tendon and similar so-called surgical forms of tuberculosis, renal tuberculosis which can be demonstrated by urological examination will be found in most, if not in all, of the cases Groeninger and Pesch (12), Bader (1), Band (2), Munro (27) and Rieder (31) have shown the same results in patients with pulmonary tuberculosis Saenz, Eisendrath, Costil and Sadetun (34) failed to find tubercle bacilli in the urine of 100 patients with pulmonary tuberculosis Medlar and Sasano (24), Lieberthal and von Huth (20), Garginski and Petresco (11) and also Wyler (40) have shown that tubercle bacilli when injected by various routes into animals are not found in the urine Montgomery and Allen (26) have found this to be true of all acid fast bacilli

One of the best recent studies of the question of evolution of renal tuberculosis in a large series of rabbits by Coulaud (3) shows that the initial lesions are always bilateral and cortical and have a tendency to heal spontaneously by fibrosis This confirms Medlar's and Band's observations Such foci do not give rise to clinically demonstrable lesions As the infection progresses the medulla and renal pelvis are next involved

To sum up, there is ample evidence at hand to show that in all probability the initial infection in renal tuberculosis is bilateral, minute, and cortical Many such foci may heal spontaneously without giving rise to tubercle bacilluria, hence are not clinically tangible or demonstrable forms of renal tuberculosis As the infection spreads, caseous foci are formed in the medullary pyramids, and give rise to ulcerations of the overlying epithelial lining of the calyces of the renal pelvis, as a rule involving only one kidney From these foci, tubercle bacilli are eliminated into the urine and at this period of evolution the disease is as a rule demonstrable clinically or by thorough examination of the kidney A true tubercle bacilluria does not exist as an impartial review of the evidence in favor of and against such an occurrence reveals The presence of tubercle bacilli in the urine signifies a specific lesion and the ability to demonstrate it by clinical and laboratory methods is possible in practically all cases if they can be kept under observation a sufficiently long time

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ADRENAL, KIDNEY, AND URETER

Jasienski, G.: A Case of Giant Hydronephrosis of Traumatic Origin (Un cas d'hydronephrose géante d'origine traumatique) *J d'urolog méd et chir*, 1937, 44: 48

A man of twenty-seven in the course of his military service was kicked by a horse in the right lumbar region. The pain was slight at first and he continued his service. The urine was clear and did not contain blood. After ten days he had pain and hematuria for three weeks. He was hospitalized for six weeks, after which he was able to continue his service.

Six months later a heavy weight fell on his lumbar region. He immediately felt intense pain and nausea. Some hours later he noticed an abdominal tumor the size of a newborn child's head. There was intense hematuria for some weeks but the patient refused operation.

Four years later he returned to the hospital with an enormous tumor of the abdomen that had greatly displaced all of the abdominal organs. He had had neither hematuria, pain, or vomiting in the meantime. He again refused operation, fearing perhaps that he would lose his pension.

The tumor was a giant hydronephrosis. Several cases have been reported in the literature in which the sac contained from 6 to 12 liters of fluid, or even as much as 30 liters. In this case it contained perhaps 10 liters and the viscera were so greatly displaced that it was hard to imagine their being more displaced. None of the cases in the literature show that a giant uronephrosis had acted on the other kidney and produced a hydronephrosis, as in this case. The pressure on the viscera had linked the opposite ureter and caused dilatation of the pelvis, and also torsion of the kidney around its transverse axis, as shown by the position of the calyces.

The pathogenesis of giant uronephroses differs. Sometimes uronephroses are congenital and due to an anomaly of development. Sometimes, as in this case, they are caused by trauma. In this case the first trauma had injured the wall of the ureter and caused the uronephrosis. It is impossible to know, however, whether it was a true uronephrosis or a pseudohydronephrosis. The second injury six months later caused rupture of the sac and transformed the open hydronephrosis into a closed pseudonephrosis, which accounts for the enormous size of the tumor.

AUDREY GOSS MORGAN, M.D.

Caulk, J. R.: Tumors of the Renal Pelvis and Ureter. *Ann Surg*, 1937, 106: 68

Tumors of the renal pelvis and ureter are comparatively rare and constitute from 5 to 10 per cent of all renal tumors. With few exceptions these tumors are epithelial, the majority being of the papillary variety. The papillary tumors have a tendency to be multiple and occur more frequently in the male. The sessile squamous-cell type shows no predilection as to sex. The papillary tumors show the well known characteristic of involving the ureter and adjacent

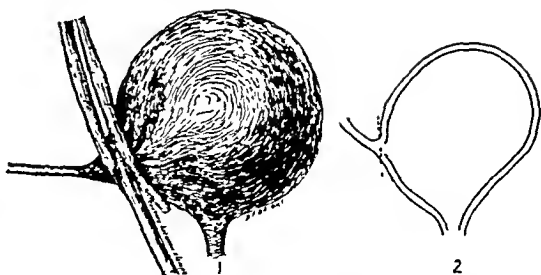


Fig 1 (1) Traction of ureter upwardly—funneling bladder with intramural ureter. Clamps applied containing intramural ureter and bladder wall. Closed resection with cutting current insuring against implantation. (2) Slight funneling of bladder from gentle traction of ureter. Dotted line shows site of ligation including part of bladder wall and intramural ureter, preventing ureteral mucous membrane from remaining external to bladder wall. Remaining intramural ureteral mucosa later destroyed by coagulating current through cystoscope.

bladder wall and even the opposite ureter. The explanations for this have been the source of considerable controversy. The author believes it is due to a multiplicity of origin. This characteristic has a decided bearing on the surgical procedure, the procedure of choice being a nephro-ureterectomy with partial resection of the bladder. Sessile tumors require only a nephrectomy.

The diagnosis of pelvic and ureteral tumors is based chiefly on repeated pyelo-ureterograms.

The treatment is unsatisfactory, the operative procedure is followed by recurrences in a large percentage of the cases. In the operative procedure the lower end of the ureter after being freed is utilized as a tractor, the funnel-shaped portion of the bladder produced by traction upon it is clamped and excised. This method greatly facilitates the operative procedure.

ANDREW McNALLY, M.D.

Goldstein, A. E., and Abeshouse, B. S.: Partial Resections of the Kidney. *J. Urol*, 1937, 38: 15

Conservative operation or partial resection in the treatment of localized disease of the kidney has gradually supplanted radical nephrectomy. In the early period of kidney surgery this operation was abandoned because of severe primary or secondary hemorrhage, the frequent occurrence of urinary fistula, and the poor results and recurrences following this type of surgery.

The experimental studies on this subject show that

1. Healing of kidney wounds is dependent upon the production of connective tissue derived from the capsule and interstitial tissue and reinforced by reticular tissue derived from the blood elements and by fibrous and fatty tissue.

2. Compensatory hypertrophy in the remaining segment or in the other kidney depends upon the amount of functional renal tissue left.

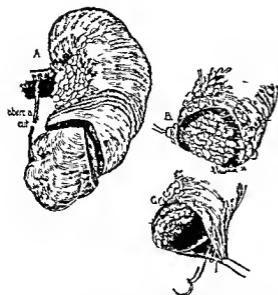


Fig. 1. Drawing of the wedge-shaped resection of lower fifth of left kidney for localized calculous pyonephrosis. A the aberrant artery supplying the lower pole of the kidney has been ligated and the capsule retracted before making the wedge-shaped excision. B the operative defect is closed by placing a pad of fat in the wound and approximating the edges of the incision with mattress sutures underpinned with fat (Beer Hagenbach method). C the retracted capsule is drawn over the incision and closed with a continuous number 00 non-chromicized suture.

3 Renal function is decreased approximately in proportion to the amount of renal tissue removed.

4 No unusual change in body function which appreciably alters the life or health of experimental animals occurs until the total remaining renal tissue is reduced to a minimum compatible with life.

5 The minimum amount of kidney tissue necessary to maintain life differs slightly in the various experimental animals.

Partial resection of a kidney is the operation of choice in the treatment of localized diseases of the kidney such as solitary serous or hemorrhagic cysts, hydatid cysts, localized hydronephrosis or pyonephrosis with or without renal calculi, benign tumors, localized cortical abscesses, renal carbuncles, renal infarcts and renal fistulas. The procedure is contra-indicated in tuberculosis or malignant tumors with a healthy kidney on the opposite side. It is occasionally indicated in bilateral disease, i.e. tuberculosis, calculous pyonephrosis and renal rupture.

In operations requiring removal of one kidney and from one half to one third of the other, or bilateral resections, it is better to perform the operation in stages with an interval of from four to eight weeks between stages. A minimum of one fourth of the total renal substance is necessary for life.

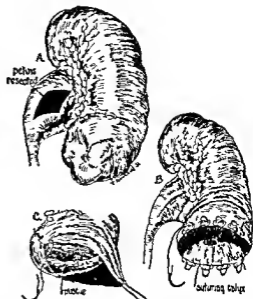


Fig. 2. Drawing of the wedge-shaped resection of the lower third of the right kidney for localized calculous pyonephrosis. A the dotted line represents the upper limit of the resected tissue. A diamond-shaped portion of the dilated pelvis was removed to correct the hydronephrosis. B operative defect resulting from the wedge-shaped excision of renal tissue. The severed lower major calyx is closed with a continuous suture of number 00 non-chromicized catgut. The edges of the wound are approximated by a continuous through and through suture of the number 2 non-chromicized catgut underpinned with fat. C, a piece of muscle is placed in the wound before approximating the edges of the wound. The capsule is closed with a continuous number 00 non-chromicized suture.

The successful partial resection requires an orderly plan of operation which includes proper surgical approach, preparation of the pedicle and ligation of the nutrient vessels to the segment to be removed, decapsulation of the kidney in the operative area and utilization of this portion of the capsule in the closure of the wound incision through healthy tissue and accurate hemostasis and approximation of the wound.

ANDREW McNALLY M.D.

Léry Dreyfus R. Intestinal Fistulas after Operations on and around the Kidney (Les fistules intestinales après interventions sur le rein et son atmosphère). *J. d'uról méd. et chir.* 1937 44 5.

Intestinal fistulas after operations on and around the intestine are not frequent. The author gives brief histories of 60 cases all that he has been able to collect. Twenty-eight of them were unpublished. Among these were 13 duodenal fistulas and 1 of the small intestine.

Tuberculosis is the most frequent cause of tears and ulcerations of the intestine; this was the cause in more than half of the cases reported by the author.

The other causes, in decreasing sequence, are lithiasis, perinephritic phlegmons, and tumors

These fistulas are caused either directly, by manipulations in freeing the kidney or caring for the pedicle after nephrectomy, or indirectly, by continued progress of the tuberculosis, or suppuration of the tissues in perirenal abscesses. In the former case the perforation appears immediately or after not more than two weeks, in the latter the fistula may not appear until some months after the operation

Anatomically, the intestinal lesions are slight. However, spontaneous healing as well as surgical cure is retarded by the fact that the fistulas are ordinarily located on the part of the colon or duodenum that is not covered with peritoneum

Fistulas of the colon generally heal spontaneously. Surgical cure is indicated only in the exceptional cases where there is some mechanical obstacle, such as a spur or a subjacent stricture, which would keep the fistula open indefinitely. Except for these indications surgery should not be attempted, particularly as the necessary operation, entero-anastomosis with colectomy, is complicated and not free from danger. Fatal cases of fistula of the colon are caused by generalization of the tuberculosis. Once closed, the fistula of the colon is not followed by any digestive disturbance

Duodenal fistulas are more serious, but they are not so necessarily fatal as they are generally supposed to be. Many of them heal spontaneously, though little is known of how to further such healing by treatment. The simplest and most logical treatment consists in prolonged ventral or lateral decubitus, which permits feeding the patient and makes it easy to care for the skin which is always exposed to the action of the digestive juices. Surgical treatment should not be considered unless this treatment fails. The prognosis in surgical treatment is always serious. Jejunostomy is the operation most frequently used and its mortality is very high. Therefore every postoperative duodenal fistula should be given a chance to heal spontaneously. Very often the results of this method of treatment are unexpectedly favorable. AUDREY GOSS MORGAN, M D

Shih, H. E.: Postcaval Ureter. *J Urol*, 1937, 38 61.

Postcaval ureter is an extremely rare condition, only 15 reports have been found in the literature. Most of the cases have been found during anatomical dissections or post-mortem examinations. Five have been discovered at operation. The anomaly is not one of the ureter itself but of the vena cava in which the right post cardinal vein persists as a portion of the inferior vena cava instead of atrophying

In the diagnosis of this condition the usual causes of kinking or angulation of the ureter must be considered. Winding of the ureter around the inferior vena cava must be considered when the vena cava is found to have been dislocated to or beyond the midline. In an oblique roentgenogram the postcaval ureter will impinge against the lower lumbar spine

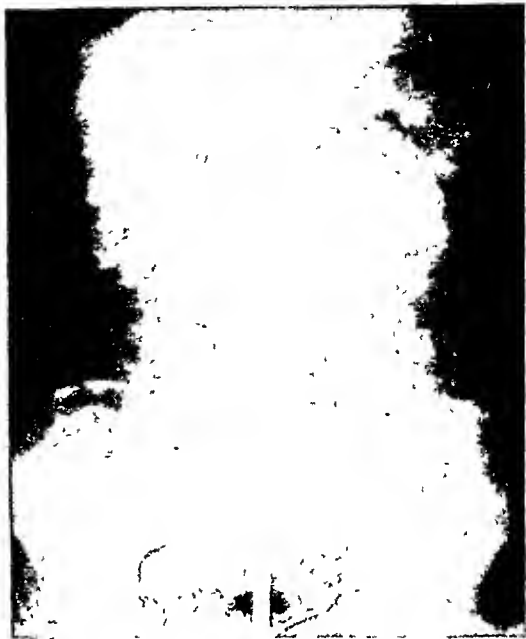


Fig 1 Retrograde pyelo-ureterogram illustrating hydronephrosis, hydro-ureter and marked curve of the ureter on the right side. Note the dislocation of the ureter in relation to the vertebral column, a diagnostic sign.

instead of falling away from it, as pointed out by Randall and Campbell. ANDREW McNALLY, M D.

BLADDER, URETHRA, AND PENIS

Badenoch, A W., and Campbell, R. I.: Foreign Bodies in the Urinary Bladder. *Brit J. Surg.*, 1937, 25 133

Foreign bodies may be introduced into the bladder through pre-existing channels, as a result of trauma, postoperatively, and via the alimentary tract. Many different articles have been inserted into the bladder through the urethra or through a fistula. Less frequently a foreign body may gain entrance into the bladder as a result of trauma. The removal from the bladder of bullets, and sequestra from osteitis of the pelvic bones has been reported. Following operations, swabs and gauze packs have been removed. Occasionally, there is an enterovesical fistula which permits the passage of a foreign body from the bowel to the bladder. Cases on record show bullets, pins, and needles to have found their way into the urinary bladder in this way

The symptoms are frequent, painful micturition, often with terminal hematuria and strangury.

The diagnosis is comparatively easy, the history, cystoscopy, and radiography, or some combinations of the three are of diagnostic value

These foreign bodies may be extracted through the cystoscope. Candle wax, beeswax, chewing gum and similar substances may be dissolved by the injection of gasoline, kerosene, or xylene into the bladder. In the case of a large foreign body, suprapubic cystotomy may be necessary.

The authors report two cases: the first that of a calculus embedded on a safety pin, which was discovered with the cystoscope and the x-rays and removed suprapubically; the second that of a bootlace lying coiled in the bladder. Cystoscopy and the x-rays showed the coiled bootlace to be covered with some phosphatic deposit. Suprapubic cystotomy was necessary for the removal of this foreign body.

ELMER HESS, M.D.

Thompson, A. R. Vesical Extroversion with Control of Micturition. *Brit. M. J.*, 1937, 2, 3.

Two cases of extroversion of the bladder are reported to show the value of a complete clinical examination under anesthesia, and the fact that operative closure of the bladder may under the conditions noted lead to voluntary control of micturition with as little disturbance of the parts as possible. The cases are important because a normal proximal urethra developed in association with extroversion of the bladder, a possibility not generally recognized. The two cases are described in detail.

In the first case, a male child aged two years had its cord cut at birth as usual. Under anesthesia, distinct extroversion of the bladder wall, smaller than usual, was found in the lower part of the abdominal wall; it was circular and umbilicated. The surface was distinctly red. In the perineum there was a similarly colored groove which passed downwards and backwards towards the anus. The extroverted bladder was separated from the perineal gutter by a bridge of skin one third of an inch wide. There was wide divanction of the rectus muscles in the lower half and of the pubic bones and a general rising of the bladder, perineum and anus cephalad. There was a large ventral hernia and at the upper part of this and slightly to the right of the midline the remains of the umbilical cord were found. The important finding was the perineal gutter with a small protuberance on each side extending downward and inward toward the midline. Each protuberance resembled a diminutive penis, an incomplete phallic eminence which had remained bifid. In the perineal gutter were five orifices; the first and most important was median and single. A probe passed through this orifice and another through the bladder opening touched each other. The author recognized this as a normal proximal urethra associated with extroversion of the bladder. Behind this opening were two paired holes, one of each pair at the side of the midline and close to it. The two posterior orifices were divided only by a bridle-like structure and opened into a single cavity which passed upward for about an inch. The two orifices in front of them opened into distinct cavities which passed upward and backward. None

of these holes appeared to have any connection with the bladder. The anterior orifice was the important one, although incomplete; it was a true urethra and hence was capable of controlling micturition.

The second case, believed to be that of a female, was operated upon twice. The first operation done when the child was three months of age was a complete failure, but the second done three months later was a complete success. A small orifice was left in the wound deliberately for drainage of the bladder. At the age of one year the baby died from pneumonia. At that time an occasional drop of urine had escaped from a small fistula in the wound. The control came through a normal proximal urethra and the fistula may have been closing at the time of death. At necropsy there was found a large extroversion of the bladder with both ureteral orifices visible. Below the bladder level was a bridge of skin which passed across the midline and connected the two sides of the abdomen. Below this was the perineum. At the front of this was a circular hole on the summit of a distinct small protuberance. Near this protuberance and orifice and on each side of the midline was a symmetrical body similar to a small penis. The tips of these paired bodies were separated half an inch. Behind and below these was a bilateral conical swelling also directed inward and downward. Years afterward the author came to the conclusion that the child was male. The anterior projections were parts of a bifid penis and the eminences behind these were undeveloped parts of the scrotum. The orifice lying in the midline was really a partially developed urethra.

The following technique was used in the first case.

The extroverted bladder was pushed back into the abdomen and an incision was carried around the mucosa. Catgut sutures were used to join the edges transversely. The circular incision was extended on each side transversely for three fourths of an inch. The skin edges were everted widely and a broad linear scar of subcutaneous tissue was exposed. Lembert catgut sutures were applied to this surface on each side of the long axis of the wound, the bladder thereby being buried deeply. The skin edges were united with fine almon gut suture. On recovery from the anesthetic the child was allowed to do as he wanted and walk about the ward. He at once was able to hold his water, and continued to do so and passed a good urinary stream. The normal proximal urethra is now controlling micturition.

LOUIS NEUWELT, M.D.

Melly, A. Tumors of the Bladder (Ueber Blasen geschwuelste). *Zschr. f. Urol. Chir. u. Gynäk.* 1937, 43, 97.

On theoretical as well as on practical grounds bladder tumors are classified into benign and malignant tumors, even though a strict differentiation on account of the occurrence of mixed forms and of malignant degeneration is not always possible. Of the

symptoms hemorrhage and urinary disturbances, the latter are the more predominant in cancer and hemorrhage is more common in benign tumors. The diagnosis can be made with certainty only with the cystoscope. The symptoms depend upon the size, location, and structure of the tumor. Infection in the presence of papilloma is more easily controlled than it is in the presence of cancer. Not much significance can be attached to the biopsy specimens obtained during cystoscopic examination. The tumors may involve any part of the bladder. In typical cases they are usually in the fundus, trigone, or the vicinity of the ureteral openings. In the benign tumors there is usually present a pedicle which can be brought into view by pushing the tumor aside with the cystoscope or the ureteral catheter. The villi are regular, and the vicinity of the tumor shows no reaction. The bullous edema is differentiated from the papillary villi by its broad surface involvement and by the absence of blood vessels. In papillary carcinoma the base is broader, and the villi are coarse, thick, and irregular. The solid cancer has a broad base, ulcerates early, and usually is surrounded with bullous edema. Cancer may also appear as a localized, clearly defined ulcer not rising much above the adjacent mucous membrane. It may not involve the musculature or the neighboring organs until very late. At the author's clinic there were treated 218 cases of papilloma, 167 men and 51 women, and 167 cases of cancer of the bladder, 120 men and 47 women. From the tabulation regarding the site of the tumors, it was ascertained that in papilloma the neighborhood of the ureteral orifices was most often involved, whereas in cancer the lateral walls were involved most frequently. In the treatment of papilloma suprapubic excision, or endovesical electrocoagulation is the method of choice. Advantages of the endovesical method are that it is more conservative and it may be repeated, and there is good visibility through the cystoscope of even the smallest villus and an absence of implantation metastases. A necessary requirement, of course, is the ability to be able to introduce the instrument. In the first case coagulation could be done only after aspiration of the villi according to the method of Bigelow. With employment of thicker coagulating sounds the tumor may be removed much quicker than with thin sounds. Borza has done his coagulating mostly with a silver needle according to the method of Frank and Joseph. In case of severe hemorrhage blood may be washed out and the bleeding surface may be crusted over. In 118 cases the tumor was removed surgically. With the bladder open the tumor and its bed may be palpated manually. The papilloma is grasped with a fenestrated papilloma forceps and removed with the scissors. If cystoscopy is impossible or difficult, cystography is of great value. If during the operation it is difficult to ligate the vessels the clamps may be left in place for two or three days. For ligation within the bladder silk is always employed. The strands are left long, brought out through the wound, and removed after five or six

days with slight tension. Before the tumor is removed it must be lifted up from its bed. A preliminary ligation of the pedicle should not be done. Among 218 patients recurrence was found in 42, in 6 (2.7 per cent) malignant degeneration occurred.

In the treatment of malignant tumors, the following methods may be employed: conservative, operative, or combined treatment. In inoperable cases, roentgen or radium treatment combined with electrocoagulation is employed. In favorably situated tumors in the fundus or in the lateral walls, the tumor may be excised in the normal surroundings and the bladder wall removed *in toto*. Radiation therapy is employed postoperatively. If the tumor is in the neighborhood of the ureteral openings the ureters must be reimplanted or a nephrectomy done, according to the case. In cancer of the entire trigone the author refuses to remove the bladder totally, as a satisfactory disposition of the ureters is as yet unknown. If radical removal of the tumor is not possible at the time of the operation, as much as possible of the tumor is removed and radium is then employed. Large defects of the fundus or lateral wall which could not be closed frequently heal upon simple tamponade and without pericystitis. After the removal of the larger masses in papillary cancer the superficial masses may be burned out with the thermocautery. Sarcoma of the bladder is observed but rarely.

In the comparison of the results of the treatment of benign tumors with those of malignant tumors, as shown by the figures from Illyes, it is shown that in the benign tumors a permanent cure is usually effected with few exceptions. In malignant tumors, however, the results are in no wise proportionate to the efforts of the physician and the sufferings of the patient in spite of temporary clinical improvement. (VON SCANZONI) LEO A. JUHALL, M.D.

Di Maio, G.: Tumors and Precancerous Lesions of the Urinary Bladder Caused by Amines and Nitroderivatives (Tumori e lesioni precancerose della vescica da amine o nitroderivati). *Arch. ital. di urol.*, 1937, 14, 283.

Di Maio examined cystoscopically 86 workmen who were employed in factories dealing with amines and nitroderivatives. He found among them 4 with carcinoma of the urinary bladder, 7 with benign, single, or multiple papilloma, 26 with precancerous lesions and 49 who were normal. Therefore, among a total of 86 workmen there were 11 (12.79 per cent) who were affected by the amines and nitroderivatives. This is the first Italian statistical report of this kind.

On the basis of an extensive study made on workmen handling these substances, the author arrived at the following conclusions:

Workers who come in contact with certain substances containing the aminobenzol group, amines and nitroderivatives, frequently show after a period of occupation ranging from one to thirteen years, congestive lesions of the vesical trigone and of the

peripapillary areas of the bladder which must be regarded as being precancerous lesions. After a period ranging from three to nine years there may be found benign papillomas in a small number of these workers. After a period of occupation of from six to fifteen years cancerous lesions may be found in others.

Among the amines which are oncogenetic are betanaphthylamine, benzidine, and aniline. Concerning the route of absorption of these oncogenetic substances and their metabolic transformation in the organism the author believes that they are taken up through the respiratory tract and through the skin. They become eliminated in part unchanged in the urine, and in part they are hydrolyzed into benzidine and naphthylamine. Other compounds, such as aniline, are oxidized in the body or are eliminated through the kidneys as paratoluidine without having undergone any chemical changes.

Concerning the pathological anatomy and the histology of the observed lesions the benign papillomas and the carcinomas have no special characteristics. The precancerous lesions are characterized by a telangiectasia, by congestive lesions arranged diffusely or in a grape-like fashion or by small hemorrhagic spots especially in the region of the vesical trigone.

Concerning the histopathogenesis of these lesions very little is known from either an experimental or a histological point of view.

Studies of the symptomatology and the clinical course of the disease have shown that benign papillomas as well as carcinomas may be present for years without giving rise to subjective and objective manifestations. In some workers there may be a microscopic hematuria, although on examination the bladder appears to be essentially normal.

The diagnosis of the tumor as well as of the precancerous condition can be made only endoscopically with the aid of the urethroscoposcope of McCarthy. Without this examination no tentative diagnosis of malignancy should be made even though the patient may present a microscopic hematuria or a slight dysuria.

The degree of benignancy of a papilloma can be determined primarily from the behavior of the lesion following electrocoagulation.

In the light of our present knowledge the prognosis of precancerous lesions cannot be formulated. The prognosis of benign papilloma in itself is favorable. In recurring cases diagnosis is reserved and in carcinoma it is bad. Early diagnosis is essential.

Concerning the therapy of precancerous lesions the author recommends irrigations of the bladder with physiological solutions or with a 1 per cent silver nitrate solution depending upon the type of lesion. Benign papillomas should be treated by electrocoagulation with the high frequency current in divided treatments so that the lesion is destroyed slowly and hemorrhagic complications are avoided.

Infiltrating carcinomas regardless of their size should be left alone. If necessary hypogastric drain

age may be instituted. Malignant papillomas and non-infiltrating carcinomas which are limited to the movable portion of the bladder are treated by subtotal cystectomy.

RICHARD E. SOMMA, M.D.

GENITAL ORGANS

Dossot R. Hormonotherapy in the Treatment of Adenoma of the Prostate (L'hormonothérapie dans l'adénome prostatique). *Presse méd. Par.* 1937 45 1004

Dossot states that in recent years an attempt has been made to substitute hormonotherapy in place of surgical treatment. It has been found that the male hormone is mainly produced by the interstitial cells of Leydig and that this principle acts also on the development of the accessory genital organs such as the prostate, the seminal vesicles and Cowper's glands. This principle is also responsible for the secondary sex characteristics and for the sexual instincts.

It has been found also that the testis is directly related to the anterior lobe of the pituitary gland. The anterior lobe secretes two gonadotropic hormones, Gonadostimulus A and B, which act on the sexual glands and stimulate their activities.

In the male Gonadostimulin A activates the cells of the seminiferous tubules and Gonadostimulin B acts on the interstitial glandular elements.

Conversely the testis has a well defined action upon the hypophysis. Castrated animals show invariably a definite hypertrophy of the hypophysis. It is believed that the testis elaborates a special hormone produced by the cells of the seminiferous tubules or perhaps by the cells of Sertoli which exerts an inhibitory action upon the hypophysis.

Certain cells called the F cells of Steinach are said to elaborate the female hormone in the testis.

In studying the relationship of the testicular and pituitary hormones to the prostate gland it was found that castration causes an atrophy of the prostate. On the basis of this experience fifty years ago prostatic hypertrophy was treated by bilateral or unilateral castration. Testicular grafts and the administration of male hormone counteract the prostatic atrophy induced by castration and female hormone if injected into normal mice produces a marked enlargement of the prostate gland. Histologically, the gland undergoes an epidermoid metaplasia.

From these observations it appears conclusive that the male and female hormones act synergistically in keeping the prostate in a normal condition.

It has been observed experimentally that the injection of an extract of the anterior lobe of the hypophysis causes an enlargement of the prostate whereas ablation of the hypophysis causes an atrophy of the prostate. According to certain authors there is a testicular hormone which inhibits pituitary action and the aqueous solution of testicular extract which is believed to contain this principle has been found to produce an atrophy of the prostate.

The author thus concludes that prostatic hypertrophy is due either to an excess of female hormone over male hormone which diminishes with advancing age, or to a hyperactivity of the pituitary gland. Therapeutically, therefore, it is necessary either to neutralize the female hormone by the administration of male hormone or to check the hyperactivity of the hypophysis.

Judging from the results reported in the literature and from his own observations, the author believes that the endocrine origin of adenoma of the prostate is possible and even probable, but that it has not been demonstrated conclusively.

Clinically, hormonal therapy has a definite effect upon the functional manifestations of prostatic adenoma, such as polyuria and dysuria, as well as upon the general condition of the patients.

Hormonal therapy of prostatic hypertrophy is accompanied by no special danger and it seems to abbreviate the duration of the crisis resulting from acute urinary retention. There are a few good demonstrations which indicate that hormonal therapy of hypertrophy of the prostate may have a beneficial effect upon complete or incomplete retention of the urine.

It has not been shown that hormonal therapy is of any value along preventive lines.

RICHARD E. SOMMA, M.D.

Cardillo, F.: The Roentgen Therapy of Malignant Tumors of the Testis (*La roentgenterapia dei tumori maligni della ghiandola genitale maschile*) *Tumori*, 1937, 23 358

In 1906 Chevassu first organized our knowledge of malignant testicular tumors when he emphasized that the majority of such tumors were of epithelial origin derived from the spermatogenic tissues, the seminomas, and distinctly separated from tumors of mesodermal origin. This concept was accepted generally in Europe. Ewing countered with the opinion that most malignant tumors of the testicle were of epithelial structure, but that all were simply different conditions of development of the fundamental mixed structure, the teratoma.

The lymphatic drainage of the testicle is important from the therapeutic point of view. The lymph ves-

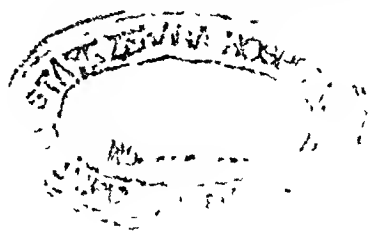
sels follow the spermatic vessels through the inguinal canal and abdomen to empty into para-aortic lymph nodes at the level of the junction of the spermatic veins with the inferior vena cava and left renal vein. From these lymph nodes vessels pass to the receptaculum chyli. The inguinal lymph nodes are not involved in the drainage system of the testicle, but they do drain the scrotum.

Malignant tumors of the testes constitute about 1½ per cent of all malignant tumors. According to some authors the incidence of tumor formation is higher in ectopically situated testes than in those in the scrotum. The diagnosis of tumor of the testis is not always simple in the early stages. Induration and pain are important in the period before swelling. The author lists the initial symptoms in a large group of patients. Metastases occur early in these tumors, as exemplified by the large number of patients who present evidence of metastases when first examined. The recent use of the Aschheim-Zondek test has been of aid in the diagnosis of testicular tumor, for a positive reaction is usually obtained.

The treatment of malignant tumors of the testis was most unsatisfactory in the years before radiation therapy. Since the advent of x-ray treatment the prognosis has been improved. Radiation therapy either alone or with subsequent orchidectomy is the most efficacious method of treating these tumors.

The author reports on a series of 25 patients. He lists the various x-ray techniques employed. One of his patients was alive after five years, 1 after four years, 1 after three years, 2 were alive after one year, and 4 after less than one year. He then discusses his results and reviews some of the literature concerning this method of treatment. Primary orchidectomy is advised by many because of its simplicity. Others believe the operation may constitute a stimulus for spreading of the neoplasm. When metastases are present, most investigators consider orchidectomy only palliative. Favorable reports are cited to indicate the favorable results after x-ray treatment alone. The author prefers the combination of pre-operative radiation of the tumor and the metastatic field orchidectomy, and postoperative radiation of the drainage areas. He outlines the technique employed.

A. Louis Rosi, M.D.



SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Hausser F. Scoliosis. A Functional Decompensation. *Arch Surg* 1937 34 1159

There are two types of scoliosis: congenital and acquired.

In the congenital type the prognosis for full recovery, both anatomically and functionally, with corrective measures is excellent.

Scoliosis is due not to an imbalance in the pull of the muscles of the back but to an increase of the normal curvatures of the back. The development of the structural changes is explained. The cause of adolescent scoliosis is given and the prophylactic measures are based upon it. The method of correction of the curvature is based on the teaching of Patrick Haglund. The lateral lumbar curve is obliterated by listing the body to the opposite side. Compensatory kyphosis is obliterated by tilting the body forward. Derotation is obtained by fixing the pelvis and rotating the shoulder girdle in the opposite direction. The pelvis is fixed in this position with a plaster of Paris jacket which encloses the lumbar area and extends up to the thoracic curve. The treatment is entirely ambulatory. Exercises follow the removal of the cast and a leather or steel braced jacket is worn until the muscles have been developed. The fusion operation is indicated in some cases of long standing which are quite fixed and in which the patient suffers from pain.

These principles as outlined may be used in either the congenital or the acquired types.

Acquired scolioses may be divided as follows:

Curvature due to the rickets of osteomalacia, which condition is rare and has a poor prognosis.

Scoliosis due to flaccid paralysis following anterior poliomyelitis. In these cases the author emphasizes the early recognition of the involvement of muscles of the abdomen and back and the protection of such muscles until they regain the maximum amount of strength. Fusion may be indicated.

Scoliosis associated with syringomyelia. The primary condition is usually progressive and determines the prognosis.

Curvature due to spastic paraplegia and hemiplegia. The prognosis in these cases is dependent on the possibility of clearing up the spastic paralysis.

Scoliosis secondary to deformities elsewhere in the body: static deformity, in which cases the prognosis is dependent on the possibility of correcting the pelvic tilt.

Scoliosis due to torticollis. The prognosis in these cases is dependent on the possibility of correcting the primary deformity.

Curvature due to local disease of the spine. This type is secondary and depends upon the eradication of the primary disease.

Curvature secondary to contracture of the chest. The prognosis in these cases is good so far as the arrest of the progress of the deformity is concerned.

Lateral curvature due to sacro-iliac disease or sciatica. In these cases the curvature will subside if the pain is relieved.

Hysterical scoliosis. This type disappears under anesthesia.

Adolescent scoliosis. In the early stages satisfactory correction and retention of normal position can be accomplished, but in extreme cases of long standing it is impossible to obtain complete correction and the fusion operation may be indicated.

The treatment of scoliosis is dependent on the factors which have produced it and is attempted in two ways: namely, by the reestablishment of normal function and the correction of body deformity.

The principle involved in the Huesing corset is incorporated in modern treatment. The principle of exercise in various forms associated with mechanical devices are of value. The use of hyperextension frames and plaster of Paris beds is condemned.

RICHARD J. BENVETT, JR., M.D.

Willis T. A. Low Back Pain. The Anatomical Structure of the Lumbar Region Including Variations. *J Bone & Joint Surg* 1937 19 745

A knowledge of the ancestral spinal column and the manner in which the lower extremities become attached to it is essential for the understanding of the anatomical structure of the lower back.

Partial lumbarizations and sacralizations are manifested by enlarged transverse processes of the last lumbar segment and variation in conformation of the articular processes and in their planes of incidence between the sagittal lumbar and the transverse sacral types. Narrowing of the lumbosacral disc is incorrectly interpreted as a pathological lesion. In anomalous sacralization the vertical diameter of this disc may vary between the diameter of the usual thick lumbosacral type and the thin sacral disc. A thin disc is in itself no proof of a destructive or pathological lesion especially if it is associated with other evidence of anomalous sacralization.

A second type of anomaly of interest in low back pain is defective development of the vertebral arch such as a break in bony continuity of the last lumbar vertebra either centrally as in spina bifida or laterally in which case there is freeing of the superior articular processes and the vertebral body from the inferior articular processes. The bilaterally defective neural arch weakens the anchorage of the torso to the pelvis at a point where the strain of the upright posture is concentrated. The author believes that such arches are separated by injuries and they should not be confused with fractures because (1) in about 25 per cent of the cases the anomaly appears unilaterally, (2) the laminae affected are often de-

fectively developed, and (3) in no instance so far reported has there been evidence of attempted bone repair, not even in the unilateral type

The clinical importance of lumbosacral anomalies and of postural variations is in direct proportion to the extent to which they weaken the part mechanically. The presence or absence of a lumbar segment is of little interest. Enlarged transverse processes, impinging on or articulating with the sacrum or the ilium, or variations in the planes of the articular processes are of importance only as sites perhaps abnormally susceptible to injury. To what extent such anomalies actually predispose to strains and sprains is problematical. Data recently furnished by Badgley and Hodges indicate that it is very little. The former, in a study of several hundred patients complaining of backache, found these anomalies in 26 per cent, the latter, in the same number of patients without back pain, found them in 27 per cent. They were present in the same proportion of our dissecting-room subjects, some of whom, but not all, probably had low-back pain during their lives. The presence of such anomalies in the vertebral column, therefore, does not solve the problem of backache.

Anomalies of the nerves, muscles, and blood vessels are associated with skeletal anomalies. Bone and soft-tissue anomalies frequently exist for years without symptoms until the relation of nerve to bone is altered by changing posture. Sciatic pain may be relieved by removal of an enlarged transverse process in some instances and by correction of a faulty posture in others.

ROBERT P. MONTGOMERY, M.D.

Bruce, J., and Walmsley, R.: Replacement of the Semilunar Cartilages of the Knee After Operative Excision. *Brit J Surg*, 1937, 25, 17.

The results of meniscectomy are among the best in the whole field of orthopedic surgery although persistent pain, effusion, or limitation of movement are occasionally encountered. The research work in this article is both clinical and experimental, and together they aim to show that replacement of excised cartilage occurs.

The function of the semilunar cartilages has been explained both morphologically and functionally. Morphologically, the semilunar cartilages have been regarded as persistent elements of the skeleton of lower forms, or as tendons or ligaments which have acquired an intra-articular situation. Functionally, the menisci are claimed to adapt the ill-matched surfaces of the femur and the tibia so that the weight transmitted through the cartilages is distributed over a larger area than it would be if the cartilages were not present. Due to their elasticity, the cartilages also absorb part of the shock transmitted through them.

The authors present 1 case in which the anterior portion of the internal meniscus was removed. Symptoms persisted following the operation. Six months later the signs and symptoms suggested an external meniscus lesion. Arthrotomy was performed and the lateral meniscus was removed. The

anterior portion of the upper surface of the medial tibial condyle was inspected and a flat piece of tissue identical in form with the anterior part of the meniscus was seen projecting from the capsule into the interior of the joint. This piece of tissue was removed and, microscopically, was found to consist entirely of fibrous tissue.

Previous experimental work by Lukjanov and Pokrovski showed that in 25 dogs the cartilages regenerated whether the meniscus was removed completely or in part. The regenerated structure was found to be histologically similar to normal semilunar cartilage. In experimental work the findings suggest that after removal of the semilunar cartilages they are replaced by a flat fibrous structure attached peripherally to the capsule.

The experimental work was carried out by excision of the lateral semilunar cartilage of the right hind leg of each of 6 young dogs. The postoperative examinations of the joints were made after periods varying from one hundred and forty-nine to three hundred and fifty-seven days. In each case the dog was sacrificed and both hind legs were amputated above the knee joint. The right hind leg was the primary operative site in each instance and the left leg was always used as a control. The findings of the experiment were as follows:

- 1 A complete or partial replacement of the external semilunar cartilage was observed in 5 of the 6 dogs. In the sixth dog the regeneration was observed only microscopically.

- 2 Hyperemia was present in 5 of the 6 post-operative knee joints. The degree of injection was inversely proportional to the size of the regenerated tissue.

- 3 The growth in width of the cartilage replacement was in all cases relatively greater than the growth in thickness.

- 4 New tissue was fibrous, and no cartilage cells were observed.

In considering the different types of fracture of the menisci the opinion of these authors is that in partial transverse tears of the menisci, total meniscectomy is the operation of choice. In mobile or dislocated cartilages it seems advisable to remove both the mobile portion as well as the peripheral rim of the true cartilage. In bucket-handle tear experimental observations suggest that the cartilage should be removed in its entirety.

The authors conclude that

- 1 Semilunar cartilages are replaced after their removal.

- 2 The new structure is composed entirely of fibrous tissue and arises from the articular capsule.

- 3 The replacement in outline corresponds to the normal cartilage, but is not of normal thickness in dogs.

- 4 There is considerable individual variation in the amount of growth, although the growth is proportional to the time elapsed following meniscectomy.

- 5 Complete meniscectomy is found to be most satisfactory.

RICHARD J. BENNETT, JR., M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES TENDONS ETC

Fisher A G T The Principles of Orthopedic and Surgical Treatment in the Rheumatoid Type of Arthritis *J Bone & Joint Surg* 1937 19 657

Defective posture is an important predisposing cause of arthritis. The circulation of the extremities is impaired and arthritis supervenes in joints subjected to undue strain for many years because of the presence of deformities due to defective posture. The author believes that by physical training in the young and middle aged and by close observance of the elementary principles of physical well being many cases of arthritis can be avoided.

The author considers the orthopedic and surgical treatment of the rheumatoid type of arthritis under two principle headings (1) prevention and treatment of deformity in the more acute stages and (2) orthopedic and surgical treatment in the more chronic stages.

The principles of treatment of the earlier stages are as follows

- 1 In the acute stages when muscle spasm is prominent, every effort should be made to prevent deformity, if necessary, with light easily removable splints

- 2 Whenever possible a movable and functionally useful joint should be preserved. However, the possibility of ankylosis is always present so that the affected joint should be maintained in the optimum position, if necessary in some form of light and comfortable apparatus which can be removed easily for local physical treatment

- 3 When muscle spasm has already brought about deformed positions of the joints, these must be corrected at the earliest possible moment and before the deformities have become fixed

Of the patients who from the first have had a more chronic type of arthritis, many will be ambulatory, except when deformity or pain is very marked. Most of the methods of physical treatment such as heat in its various applications, electricity, ultraviolet or balneological therapy achieve their purpose best when combined with movements especially in the form of carefully graduated exercises to strengthen the weakened musculature and to restore movement to the joints stiffened by the disease. Orthopedic apparatus may be necessary.

Manipulation of a stiffened arthritic joint should never be performed when signs of active disease are present either in the stiffened joint or in other regions. If there is any doubt about this the sedimentation rate should always be ascertained. Roentgenographic examination is necessary preliminarily as cases showing marked destruction of the articular surfaces or dense intra articular ankylosis either fibrous or bony are obviously unsuitable for manipulation. Joints with minor degrees of stiffness often improve markedly under physical treatment.

One of the most important factors of success in manipulative work is the policy of gradually restor-

ing movement by a carefully planned series of manipulations. In this way, reaction in the manipulated joint can usually be avoided completely. In straightening a flexed knee, for example the limb is temporarily fixed after manipulation in some easily removable splint in the improved position attained by the first manipulation. The splint is removed daily for physical treatment including active movements. After a week or possibly a little longer a further manipulation is performed and the splint is reapplied at the altered angle. This process is repeated until complete extension is restored.

Surgical operations may be divided into those which aim at fixation or ankylosis of the affected joint and those which endeavor to retain a movable joint. As a general rule in cases of advanced arthritis ankylosis in the optimum position is aimed at in the weight bearing joints of the lower extremity in which stability is a principal consideration.

Excision of an arthritic joint is indicated when pain is severe, resists other measures and is associated with marked destruction of the articular surfaces. In the case of the knee after removal of the articular surfaces ankylosis in the optimum position is deliberately sought but in the cases of the hip, the shoulder, the elbow, and the metatarsophalangeal joint of the great toe the ultimate aim is usually a movable joint.

Arthrodesis aims at the production of ankylosis in a joint and is most often performed upon the hip joint when pain is intolerable and resists other measures. When it is performed satisfactorily and bony union is secured relief from pain is obtained. The operation is a severe one and it is often contraindicated by the age and general condition of the patient. This operation should never be performed without a previous thorough and patient trial of modern methods of physical therapy and particularly of manipulative treatment.

Osteotomy is necessary when osseous ankylosis has occurred in a bad position. This operation is valuable in cases of ankylosis of the shoulder or hip in marked adduction.

Arthroplasty is an operation that is at present on trial in the treatment of arthritis. With further study and technical improvement it may prove to be of great value. The indications for its performance are cases of bilateral ankylosis such as stiffness of both hips, elbows or knees or combinations of ankylosed hips and knees.

Posterior capsulotomy is of value in cases of obstinate flexion deformity of the knee which have proved resistant to manipulation in which the roentgenogram shows slight or moderate changes in the articular surfaces and in which it is clear that the obstruction to extension is due to contracture of the posterior portion of the capsule of the joint.

Synovectomy is a valuable procedure in suitable cases. It is particularly indicated in cases of the rheumatoid type of arthritis of the knee joint in which the disease affects principally the synovial membrane and in which enlarged and tender syn-

novial villi can be palpated. The latter, by becoming squeezed between the articular surfaces, give rise to recurrent attacks of pain and effusion.

NORMAN C. BULLOCK, M.D.

Logrèscino, D. Arthrodesis of the Shoulder According to Putti (*Artrodesi di spalla secondo Putti*). *Arch. ital. di chir.*, 1937, 45: 591.

Logrèscino states that Albert, in 1879, performed the first scapulohumeral arthrodesis. This was followed by considerable criticism concerning the advantages obtained from this type of operation. The main objections made were that with this type of operation the articulation is permanently destroyed, the extremity cannot be lengthened, and in certain cases a satisfactory synostosis cannot be obtained.

After having briefly reviewed the literature on this subject, the author describes briefly the method of an extra-articular arthrodesis as suggested by Putti. An incision is made from the medial extremity of the spine of the scapula along the bony crest to the acromion. Following the longitudinal axis of the humerus up to the insertion of the deltoid muscle the level of the bone is reached (Figure 1 a and b). With a periosteum elevator the spine of the scapula and the acromion are exposed and by means of an osteotome a transplant is prepared as shown in Figure 1 c and d.

Following incision of the fibers of the deltoid muscle the upper third of the diaphysis of the humerus is reached. On its surface an opening is made with a distal base, 2 cm wide and 3 cm long. The arm is placed in abduction and the transplant is

placed with its vertebral end into the opening made in the humerus. The acromial end is fixed with catgut to the surface of the acromion as shown in Figure 1 e and f.

In a mixed arthrodesis, intra-articular and extra-articular, an arthrotomy is performed which is followed by a temporary luxation of the humeral epiphysis. Its articular cartilage is decorticated from the articular surface. After removal of the articular cartilage of the glenoid fossa the two denuded articular surfaces are brought into apposition.

In the author's series of observed cases, an extra-articular arthrodesis was performed in 4 patients who were suffering from tuberculous osteo-arthritis of the shoulder after long conservative treatment. Mixed arthrodeses were attempted in 4 other patients. Three of these had had poliomyelitis and 1 had paralysis of the upper extremity following a basilar meningitis. The author subsequently reports in detail the clinical histories, diagnoses, and treatments of these patients.

Figure 2 shows the results obtained one and one-half years following the operation. The extremity can be extended and anteposed easily to 80°. As can be seen, the esthetic and functional results obtained are excellent.

The operation is especially indicated in cases of tuberculous osteo-arthritis of the shoulder. Other indications for this operation are cases in which a destructive process of the glenoid fossa and the humerus has occurred, cases in which osteomyelitic foci or lesions involve the upper third of the hu-

Fig. 1. The various steps of an extra-articular arthrodesis of the shoulder according to the original technique adopted by Putti.

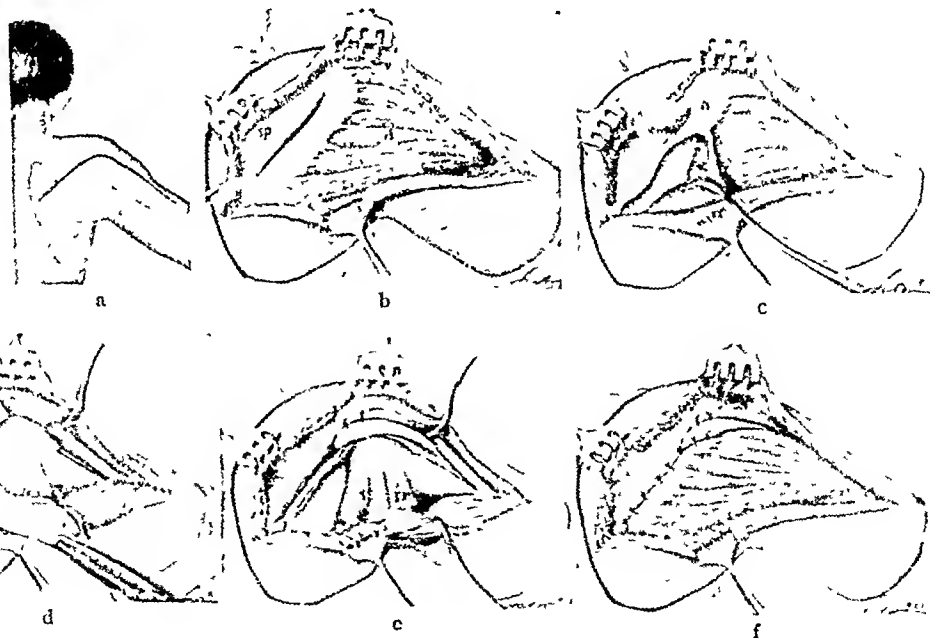




Fig. 2 One and one half years following the intervention. The extremity can be extended and anteposed easily up to 80°. Excellent esthetic and functional results.

Concerning the postoperative course of the operation a complete synostosis will usually take place in one or one and one half years following the operation. In mixed arthrodeses a synostosis will be formed sooner. The esthetic and functional results obtained are usually excellent.

The author concludes by stating that extra articular and mixed arthrodeses as suggested by Putti have fully satisfied the purposes of their application and therefore should be applied more frequently.

RICHARD E. SOMMER, M.D.

Compare E. L. The Operative Treatment for Low Back Pain. *J. Bone & Joint Surg.* 1937 19 749.

Of 2,242 patients that came to the University of Chicago Clinics because of low back pain 76 were operated upon. Definite lesions such as spondylolisthesis, spinal cord tumors, bone tumors, tuberculosis and chronic sclerosing osteomyelitis were demonstrated in 47 cases; an incidence of 3.4 per cent. The 29 patients who had only low back pain without any roentgenographically demonstrable pathological changes upon whom arthrodesing operations were performed represent an incidence of 1.3 per cent.

The more common operative procedures for relief of low back pain are lumbosacral fusion, sacro-iliac fusion, transsacral fusion, facetectomy, section of the iliofemoral band, section of the piriformis muscle and subperiosteal stripping of the gluteus maximus muscle.

An arthrodesing operation is the procedure of choice. The operation itself is preceded by vigorous stretching and manipulation. It is further recommended that in fusing the spine care be taken that

the normal lumbar curve be preserved. If there is a sciatic neuritis the surgeon should excise the articular facets on both sides between the fourth and fifth lumbar vertebrae and the fifth lumbar vertebra and sacrum.

Four contra indications to low back fusions are infectious or multiple arthritis, elderly or poor risk patients, female patients before puberty and patients without definite evidence of osseous deformity or disease until conservative measures including the Goldthwait or Williams program, manipulation and cast or the Ober operation have been given a thorough trial. Also compensation cases should not be treated before financial settlement.

A table of 14 cases is presented to emphasize the fact that the orthopedic surgeon must be constantly alert to the fact that neurological lesions or primary osseous neoplasms may produce symptoms of low back pain and sciatic neuritis and that not all patients with intractable low back pain which is not relieved by a conservative program should be subjected to arthrodesing operations or to other surgical procedures.

Indications for operative arthrodesis of the lumbosacral and sacro-iliac joints is indicated in cases of chronic low back pain due to spondylolisthesis, spondylolysis or solution of the bony continuity of the isthmus or pars interarticularis of the neural arch without displacement, tuberculosis of the lumbosacral or sacro-iliac joints, localized disabling low back pain with or without congenital anomalies which cannot be relieved by more conservative procedures, chronic pain following fractures or fracture-dislocations of the lumbosacral or sacro-iliac joints and chronic sclerosing osteitis involving these joints.

The vast majority of cases of low back pain can be relieved and the patient restored to functional usefulness without operative interference. Correction of poor body mechanics by physical therapy including stretching of contracted fascia or muscles, exercises and the use of an efficient spine brace over a period of time will restore the average patient to a reasonable degree of normalcy.

ROBERT P. MONTGOMERY, M.D.

FRACTURES AND DISLOCATIONS

Lexer E. W. Errors in the Treatment of Fractures and Their Relationship to Pseudarthrosis (Fehler d. r. Frakturbehandlung und ihre Beziehung der Pseudarthrose). *61. Tag d. deutsch. Ges. f. Chir. Berlin* 1937.

The term pseudarthrosis is generally applied to the final condition of an ununited fracture. If the period of normal fracture healing has elapsed it becomes a delayed callus formation which in turn passes into a pseudarthrosis. Of 3,270 cases of fractures seen at the clinic from 1928 to 1936, 125 had disturbed healing. Of these 53 were admitted as definite pseudarthroses, 50 fresh fractures were operated upon because of delayed or abnormal callus formation. The 20 pseudarthroses occurring in the

clinic followed compound or comminuted fractures. Next to local causes, the origin of a pseudarthrosis may very often be traced to unfavorable immediate management. The deleterious effect of prolonged or too rigorous extension is known: absence of callus due to lack of muscle reaction, and sequestra at the site of drill holes for wires are the result.

Further causes of pseudarthrosis are insufficient immobilization with disturbance of young callus, especially in the second half of the treatment period, and premature weight-bearing. Injudicious surgical intervention for the apposition of fractures produces frequent, but avoidable, non-union. For example, in short oblique fractures the circular wire may slip into the fracture space and lead to resorption; furthermore, the nutrition of the periosteum may be damaged by extensive stripping of the muscle. Drilling for the placement of bone sutures retards the union of shaft fractures as security is uncertain and the bone marrow and periosteum are damaged. Steel bands such as Lane plates may be snapped off by strong muscle pull after loosening of the screws. However, surgery should not be delayed unnecessarily in those fractures which are known to develop into pseudarthrosis. Prolonged immobilization and stiffening of the joints are thereby avoided.

The treatment becomes more difficult in chronic complicated pseudarthrosis, as interference with the poorly nourished scarred soft parts may lead to severe damage of the nutrition. The author's cases of delayed callus formation consistently progressed to bony union when bone grafting was carried out early. Drilling is valuable if the bone ends are healthy and the muscle coverings preserved. Bony union occurred in 15 cases. Despite the difficulties encountered in the bone grafting of old pseudarthroses, a lower thigh amputation was performed only once, the indication was the reactivation of a chronic infection with widespread skin necrosis. In 7 cases previously infected portions of the partially resorbed transplants were removed. With the aid of fresh bone and periosteal transplants, bony union resulted. In all, 99 transplants were done.

If a bone graft should fail because of chronic osteomyelitis, a second transplant may still result in union. One series of roentgenograms revealed the development of pseudarthrosis following surgical intervention; another set of films showed bone necrosis after surgical alignment of a child's femur with metal bands which restricted bone growth. Resorption following wiring may be avoided by using the new elastic Krupp wire. JEROME G. FISHER, M.D.

Logrèscino, D. Ski Fractures of the Metacarpals (I fratture dei metacarpi da sci). *Chir. d'organi di movimento*, 1937, 22: 479.

Skiing requires a number of maneuvers which are fairly common and characteristic and often lead to falls at the same point in the maneuver. As a result it is to be expected that similar mechanisms of trauma would recur often and lead to characteristic and comparable ligamentous and bony injuries. Cer-



Fig 1. Spiral fracture of the third, fourth, and fifth metacarpals.

tain types of spiral fractures of the metacarpals belong in this category. In this report of 12 cases, all of the fractures are similar in that the spiral in the metacarpal is directed from the ulnar toward the radial side as one passes distally (Fig 1). This fracture is caused by a fall upon the back of the hand which grasps the ski pole.

Other types of fractures also occur in skiing in which other mechanisms are involved, but they are less typical.

A. LOUIS ROSI, M.D.

Brookes, T. P.: Fractures and Dislocations of the Cervical Spine. *J. Am. Med. Ass.*, 1937, 109: 6.

The author reports on a series of 90 patients with dislocation of the neck, all of whom had been transported considerable distances and very few of whom had adequate immobilization during transportation to the hospital.

He lists three principles of first-aid preparatory to transportation of the patient:

1. Movement must be reduced to a minimum.
2. The patient should be put in the proper position for moving, that is, on the abdomen in injuries of the thoracic or lumbar vertebrae, and on the back for injuries of the cervical spine.
3. Immobilization must be such as to preclude flexion, lateral bending, and rotation of the head. Several good devices for immobilization are mentioned but the most universally available satisfactory one is sand bags, three-fourths full and placed on both sides of the head and along the shoulders.

The pillow splint is mentioned as being acceptable. In any case a small firm pad must be placed under the midcervical region to sustain the natural cervical curve.

Routine roentgenograms include one lateral and two anteroposterior views. One of the latter is taken through the open mouth to show the atlanto axial relationship. In special cases stereoscopic or oblique views are recommended.

The first step in the treatment is closed reduction usually under general anesthesia. The Taylor technique of immediate traction and manipulation offers the safest and surest method of reduction of dislocations and fractures. The Walton maneuver of retro lateral flexion and extension is reserved for old neglected cases. Following reduction immobilization is obtained by a plaster curass; this is believed to be far superior to other types of treatment. Stockinet is applied in two pieces, a shirt from the neck to the waist and a hood with anterior and posterior skirts to be fastened to the shirt. The shoulders, thyroid area, the chin, and the back of the occiput are covered with felt. Sheet cotton is applied smoothly in a thin layer. To keep the weight of the cast to a minimum plaster splints or slabs are used over the points of stress. The incorporation of tapes for traction subsequently is done only in those cases in which complete immediate reduction is impractical or impossible.

After care for pressure sores, trophic skin disturbances, and the patient's morale is important. Cord lesions must be treated. One important fact in high cord injuries is the inability of the patient to cough and thus to clear his throat of secretions, and for this reason it is recommended that in such cases an aspirator be available at all times.

Results are proportional to the accuracy of early reduction and the details of postreduction attention.

THOMAS C. DOLGLASS, M.D.

Haguer P. Isolated Fracture of a Supernumerary Ossicle of the Tarsus Os Peroneum Presence of a Bilateral External Tibial Bone (Fracture isolée d'un osselet surnuméraire du tarse os peroneum. Présence d'un os tibiale externum bilatéral). *Revue d'orthop.* 1937 24 350.

Haguer reports the case of a sixty-five year old woman whose right foot was injured by the fall of a metal plaque. Inasmuch as the pain persisted in spite of treatment she was brought to the clinic where an examination revealed an ecchymosis on the dorsal aspect of the right foot corresponding to the original site of the injury. There was a certain degree of edema present in the region of the cuboid

bone. On pressure pain was elicited at the inferior aspect of the cuboid bone near its external border and along the entire course of the long peroneal muscle. A tentative diagnosis of fracture of the cuboid bone was made.

Roentgenological examination revealed along and above the external border of the cuboid bone about at the level of the medio tarsal articulation the presence of a supernumerary bone. Its shape was oval, the borders were distinct and an irregular and jagged T shaped fracture was found to divide this abnormal bone into two fragments, a large posterior one of triangular shape and a small anterior one. The examination revealed also the presence bilaterally of an external tibial bone.

The foot was immobilized at an acute angle and the patient was ordered to bed for two weeks. After one week she began to resume her activities and made an uneventful recovery within two weeks following admission to the hospital.

In reviewing the literature, the author was not able to find any similar case reported in France. In Italy 6 cases have been reported: one of a forty-three year-old woman and the other of a thirty-three year-old man. In the first case the fracture of the os peroneum had been produced by a false step and in the second case it occurred as the result of trauma. Since 1906 6 cases of similar fractures have been reported altogether.

The author concludes that fracture of the peroneum is exceptional. This ossicle occurs as a supernumerary bone in about 7 per cent of the cases. In the absence of a roentgenological diagnosis the condition is usually confused with a simple contusion or with a sprain.

Two types of fracture may be distinguished: (a) a fracture of the os peroneum associated with other lesions of the foot, and (b) isolated fracture of the os peroneum, which is more rare and interesting.

The fracture usually occurs in the right foot, most commonly as the result of trauma. The mechanism with which this trauma is produced is the same as that of fractures of the sesamoid bones, i.e. by direct impact by *contre coup*, or by a tendinous avulsion from a forced movement of hyperextension.

Clinically the condition is characterized by a localized contusion with more or less functional impairment. There is usually severe and persistent pain.

Diagnosis can be made only by a comparative bilateral roentgenological examination. Treatment consists of immobilization, preferably in a cast and in varus position for a period of from two to three weeks or more. If no relief is obtained the bone should be excised.

RICHARD E. SOMMA, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Theis, F. V.: Popliteal Aneurysms as a Cause of Peripheral Circulatory Disease: with Special Study of Oscillomographs as an Aid to Diagnosis. *Surgery*, 1937, 2 327

Aneurysm of the popliteal artery is a more frequent cause of circulatory disturbance than is commonly recognized. Early diagnosis of the aneurysm is difficult and the symptoms of intermittent or continuous calf pains and discoloration and coldness of the foot may overshadow the findings in the popliteal space. The popliteal space is carefully examined only when local complications are produced by the advanced stages of the aneurysm.

During the past two years, a series of more than 200 patients suffering with circulatory disease included 5 with popliteal aneurysm. In all 5 cases the early symptoms were those of circulatory disease. In 3 of the 5 cases, the sac was patent and the oscillomographs were characteristic in confirming the diagnosis of aneurysm. Examination for all circulatory diseases should include temperature readings, oscillomographs, and differential tests for organic and spastic disease.

Five cases are reported with illustrations of the oscillomographs. The features of these graphs are explained with the mechanics involved in the interpretations. The oscillometric index shows that increased resistance to the flow of blood due to muscular activity or to vasoconstriction from exposure to cold is accompanied by greater dilatation of the aneurysmal sac.

Published reports are of little value in estimating the frequency of the smaller non-surgical aneurysms as a cause of circulatory disease. The diagnosis of aneurysm is usually made when the sac is large and serious local complications are present. Consequently almost all reports are surgical. Oscillomographs provide a means of early diagnosis of the smaller non-surgical, as well as of the larger surgical, aneurysms.

As to etiological factors, syphilis does not play an important rôle. When a history of the onset is given, forced flexion of the knee with violent muscle strain which increases the arterial tension is found to precede the initial symptoms. If the rupture of the two inner coats of the vessel is small, the aneurysm is slow in forming.

Arteriography is not recommended. The objections to arterial injection in the presence of an aneurysm should make one hesitant to use the procedure.

The prognosis is not serious. Before local complications occur in the popliteal space enlargement of the sac may be delayed by the avoidance of severe muscular exercise or exposure to cold. In 3 of the 5 cases reported thrombosis of the sac as well

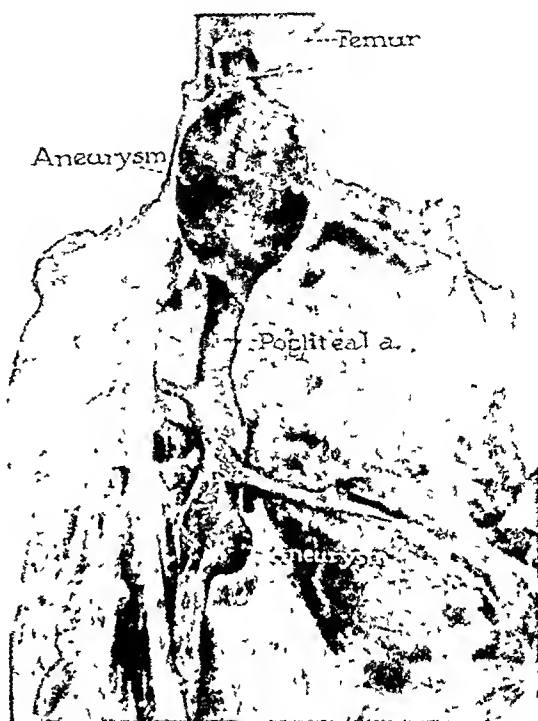


Fig 1 Photograph of dissected popliteal space from amputation. Note the two aneurysms and the enlarged collateral arteries.

as of the popliteal artery produced neither trophic disturbances nor disability. The advance in the treatment of circulatory diseases has improved the prognosis in popliteal artery obstruction. Adequate pre-operative preparation, selection of the time of operation, and postoperative management permitted resection of the aneurysm and artery in 3 patients, with return of normal function of the extremity. Before adequate collateral circulation is established the presence of infection in the extremity is a serious complication. The accompanying illustration was obtained from an operative specimen. Amputation was necessary because of streptococcus infection of the foot.

Cruickshank, M. M.: Primary Thrombosis of the Axillary Vein. *Edinburgh M J.*, 1937, 44 597

Primary thrombosis of the axillary vein was first described by Paget in 1875, who referred to it as "gouty phlebitis." Numerous other authors have reported cases since that time. It is pointed out that the left axillary vein is usually the one affected. Possible reasons for this are mentioned. The con-

dition occurs generally in young robust individuals and it is noteworthy that it usually occurs in those who are engaged in some type of work to which they are not accustomed. Many theories are advanced as to the etiological factors. Clinically there is some pain with swelling of the shoulder and arm, and later some degree of cyanosis, weakness of the affected arm and tingling of the fingers.

The author describes a useful adjunct to making the diagnosis, i.e. the injection of Urn electan B into the left median basilic vein and then taking a roentgenogram of the shoulder. A case is reported. Treatment consists in resting the arm for from ten to three weeks in an elevated position until the collateral circulation has been established.

PAUL MERRELL M.D.

Mueller A. Thrombophlebitis and Its Ambulant Treatment with Compression Bandage (Die Thrombophlebitis und ihre Behandlung mit komprimierendem Gebirband). *Med Klin* 1937 2: 793

Thrombus formation must be looked upon as a complex process, and the various forms must be differentiated theoretically and practically. The author first discusses the therapeutic influencing of septic thromboses which are designated as true thrombophlebitis. In the absence of a general predisposition to thrombosis they possess a more localized and inflammatory character. The frequently advancing inflammatory disease of the vessel wall in addition to toxic injury of the blood and changes in the circulatory rate, causes a tendency toward thrombus formation which rarely leads to embolism because of the inflammatory fixation of the thrombus. The site of the thrombophlebitis is usually the long saphenous vein. The causal genesis of thrombophlebitis is discussed in greater detail. For the development of thrombophlebitis, slowing of the blood stream from long recumbency and poor circulation plays an important rôle. Endothelial changes especially in infectious processes are also of significance.

In practice, the clinical pictures of inflammatory and spontaneous thromboses are difficult to differentiate from one another. There are indefinite gradations between spontaneous distant thrombosis and thrombophlebitis. In the latter there is always fever and frequently edema but these may also occur in the remote thromboses. Spontaneous thromboses usually appear postoperatively but thrombophlebitis may occasionally also occur at such time.

The compression bandage is recommended as the treatment of choice. Only by mobilization therapy can the blood flow be improved and the danger of spontaneous distant thrombosis and pulmonary embolism be reduced. In contrast to the lax supportive bandage the compression bandage may also be used in the treatment of the deep venous thromboses of the leg. The results of treatment in 85 cases of deep thrombosis are briefly discussed. After applying the compression bandage the patients usually get up within a few days. Within from ten to fourteen days there is a complete disappearance of all symptoms and complaints in most cases. There were no pulmonary infarcts but 2 fatal embolisms occurred which were ascribed to spontaneous distant thromboses that developed in spite of the compressive bandage. The author gives a detailed description of these two cases.

Inasmuch as the compressive treatment reduced the mortality from embolism from 25 to 23 per cent it is considered much superior to conservative management by elevation and immobilization. The author considers the latter method technically incorrect. As after treatment the wearing of elastoplast and, later of elastic bandages is recommended. In many cases the application of the compression bandage at the beginning of phlebitis has yielded excellent prophylactic results. This is true also in superficial thromboses in which an elastoplast bandage often suffices. The varicose syndrome and leg ulcers are further important indications for the compression bandage.

(HAGEN) LEO M. ZIMMERMAN M.D.



SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Galtier, M.: Free Full-Thickness Skin Grafts
(Greffes de peau totale libres) *J de chir*, 1937,
50 322

The advantages and disadvantages of free full-thickness grafts are well known. The author describes a technique which he has used for two years and which permits him to use grafts as large as 100 sq cm, place them on any region of the body, and obtain "takes" in 100 per cent of his cases. For thick grafts he uses skin from the flank or abdomen, for thin grafts the skin is taken from the inner side of the arm, the clavicular region, or the thigh. The best bed on which to place it is a fresh surgical wound, not an aponeurotic or fascial layer, but one which has some fat or subcutaneous tissue. Except in children local anesthesia with the addition of adrenalin is used, which helps reduce the bleeding and necessity for tying many bleeding points. It is followed by a postanesthetic vasodilatation which is desirable. The area to be grafted should preferably be rounded or rectangular with rounded corners. After excision of the scar or other lesion, the entire skin edge is undermined for a distance of about 3 mm. A hot adrenalin tampon is then placed on the raw surface to complete

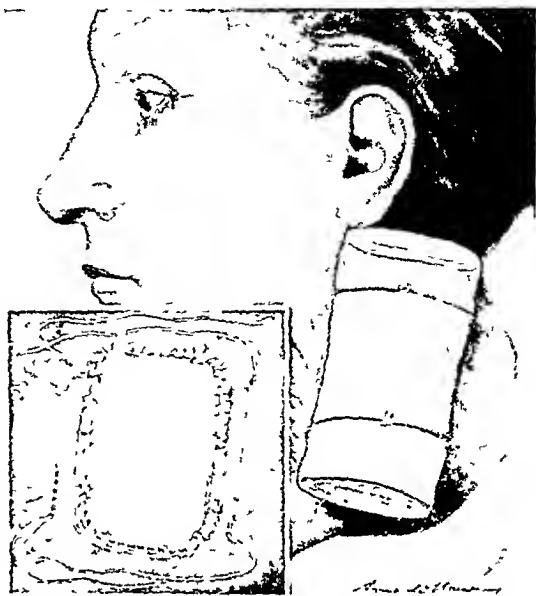


Fig 2 The graft in place with the points of support and the peripheral suture completed. Two threads have been passed in a single loop under the skin, $\frac{1}{2}$ cm from the edges. Their length beneath the skin is equal to the length of the edges of the graft.

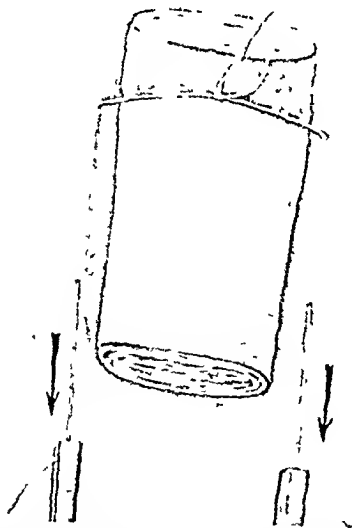


Fig 1 The compress in place. The two threads are knotted at their upper ends. Traction strong enough to cause a crease in the dressing is made. The two lower ends are then tied under tension across the compress at its lower end.

the hemostatis while the graft is cut. The latter should be exactly the size and shape of the area to be covered. It should be outlined by an incision perpendicular to the surface, and in its dissection only the thickness of the true skin should be removed and all fat and subcutaneous tissue carefully left behind.

When placed on the area to be covered it appears to be too small on account of contraction, but when anchored by interrupted fixation sutures it readily fills the area. The graft is then accurately fixed by a continuous lock stitch of fine silk, No. 000, placed with semi-curved cutting edge steel needles such as are used in ocular surgery. This suture is started at one angle and carried half way around. A second suture is then begun at the original starting place and carried around the other half to complete the circuit. The chief innovation described is the method of applying the compression dressing. This consists of gauze with a central leaf of cotton or cellulose rolled into a flattened compress. Various sizes are prepared in advance and the one selected should be large enough to completely cover and slightly overlap the graft. Instead of bandaging it against the graft, the compression is obtained by holding this dressing by two deeply placed sutures. With a Reverdin needle two sutures are passed beneath the skin along the two longest edges of the graft for its entire length, 1 cm

beyond the suture line (Figure 1) This dressing is then laid on the graft

Two ends of the deep sutures are now tied across it at one end Traction is then made on the two free ends until the proper tension is obtained, and then these are tied across the compress so that they pull it firmly and evenly against the graft (Figure 2) This method brings the graft in firm contact with the underlying tissue without undue pressure on the deep blood supply, or as the author expresses it the graft is compressed against the dressing not the dressing against the graft The wound from which the graft was cut is now undermined and closed by sutures which are removed not earlier than the fifteenth day The graft is dressed for the first time on the twelfth day by cutting the threads holding the compress Although the graft may be uniformly ecchymotic at times with blisters filled with blood, and may look gangrenous it should not be disturbed or any part cut away as the deep layers are vascularized and the surface should be left as a protective layer until regeneration of the epidermis occurs The graft is therefore covered with a layer of peroxide of zinc until the eighteenth day when the sutures are removed No dressing is then applied but the surface is insufflated with an inert powder of zinc peroxide It is necessary to follow the directions regarding the dressing, very accurately to obtain good results Photographs of cases before and after grafting are included in the article

M M ZWINGEN, M.D.

Ribeiro F E. and Delfort D. The Hydration of Surgical Patients by Continuous Venoclysis (A hidratação dos operados venoclise continua) *Rev de chirurg de S Paulo* 1937 3 59

The author points out the disadvantages of administering water to dehydrated patients by mouth, duodenum rectum and hypodermically He advocates supplying patients who have been operated upon with water by continuous intravenous injection This method was first used by Matas of New Orleans and Hendon of Louisville and called intra venous drop injection The fluid is not really given drop by drop but in a fine continuous current regulated by an attachment fixed between the retractor and the patient's vein The author therefore prefers the name of continuous venoclysis

The apparatus used is very simple It is illustrated It consists of a reservoir for holding the fluid a rubber tube the attachment for regulating the flow and the needle for injection into the vein

Not only can the patient be supplied with the necessary amount of fluid by this method but any desired medicines may be administered in the fluid such as heart tonics sera vaccines barbiturates and acidin derivatives The solution ordinarily used is a physiological salt solution of which as much as from 2,000 to 4,000 c cm may be given in twenty four hours Needless to say the solution must be perfectly sterilized If the osmotic balance of the tissues is upset by giving too much salt it may cause edema

The edema in these cases is caused by the excess of salt and not by the liquid In cases with edema the salt solution should be suspended and a 5 per cent dextrose solution given This brings about rapid disappearance of the edema In addition to combating acidosis glucose solution given in this way is an excellent source of energy The dextrose should be given in 5 per cent isotonic solution or a hypertonic 10 per cent solution in physiological salt solution Unless there are special indications this concentration should never be exceeded Not more than from 4 to 5 c cm should be given per minute to avoid special stimulation of the pancreas with an exaggerated production of insulin Hendon says that an individual weighing 68 kgm can easily support 0.9 kgm of glucose in twenty four hours The appearance of glucose in the urine shows that the limit of tolerance has been passed

Ringer's solution may be used alone or as a vehicle for glucose The amount of liquid to be injected in twenty four hours depends on the degree of dehydration The duration of the venoclysis also depends on the patient's needs In the authors cases the maximum time was four days but cases have been reported in which it was kept up for ten or even twenty days without injury When the urine eliminated in twenty four hours reaches normal the patient is sufficiently hydrated The volume of the urine shows the water balance of the tissues very well

When properly given there is no danger in venoclysis Harm may be done by giving a too large amount of fluid but if the warning signs are heeded there is no necessity for this If the cannula is left in place too long it may cause thrombophlebitis If the venoclysis is to be kept up for a very long time the authors recommend changing the vein

AUDREY GOSS MORRIS, M.D.

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Padgett E C. Care of the Severely Burned with Special Reference to Skin Grafting *Arch Surg* 1937 35 64

Of a series of 514 skin grafts transplanted at 361 separate operations on 257 different persons 299 were transplanted at 193 separate operations on 144 persons to alleviate a burn To exemplify the problems encountered in the care of a severe burn in the early the intermediate and the late stage, a series of 144 burned persons was found to present the necessary situations

In the care of the severely burned greater emphasis should be focused early on alleviation of the profound systemic disturbance than is placed on the care of the local lesion The recognition of the depth and the area of complete epithelial destruction is an essential point to be grasped if one is to understand the principles of re-epithelization and the basic cause of contractural deformity Early resurfacing after a large complete loss of skin should always be the goal

of the efficient surgeon because of the decrease in the period of convalescence, its economic potentialities and the prevention of contractures with the functional incapacitation which accompanies them. Provided the general condition of the patient is good, the success in growing thin skin grafts on a granulating surface is directly proportional to the general cleanliness of the surface. In an anemic person the chance of a good "take" on a surface of granulation tissue is decreased.

In the successful grafting of skin dependence on simple fundamental principles and methods, in contradistinction to a special type of graft with or without a "far-fetched" method of placement, puncturing, or dressing, is important. In the correction of cicatricial defects after complete healing has occurred, the decision whether to use a thin graft or a full thickness graft depends on a careful balancing of the characteristics of the two grafts, the main object to be attained in a given region, and the relative risk of failure to get a good "take." Sometimes the disability entailed in the removal of the graft and the length of the period of postoperative dressing also become factors to be considered. After observing a series of 50 experimental homotransplants in man, the conclusion was reached that isodermal grafting is not a practicable procedure unless an identical twin is available.

STANLEY J. SEEGER, M.D.

Uzac, J.: Accidents Caused by Electricity (Accidents produits par l'électricité) *Presse méd.*, Par., 1937, 45, 836.

This study of electrical burns is based upon the records for a fifteen-year period of a railway system.

There are two general types of local lesion, namely, burns due to an accidentally produced arc, and burns resulting from the passage of a current through the tissues. In the first instance the injury is caused directly by the incandescent gases between the conductors. In the second the tissues are heated by the passage of the current through them, which is called the Joule effect. It is only the latter type of injury that is specifically related to electrical action. Such lesions are deep and more extensive than the initial aspect of the tissues indicates. The structures that suffer the most are those offering the greatest resistance to the current, that is to say, the skin and tendons. Extensive aseptic sloughing often occurs and, with healing, tendons become involved in a solid block of scar tissue. Severe grades of disability are the result. With extremely high voltages an entire extremity may be carbonized or, as in one case cited, the entire body.

The general effects of electrocution vary from syncope to sudden death. The conditions realizing these effects are a large surface of contact and the passage of the current through vital regions of the body. The conditions approximate those of legal execution. When death occurs, the autopsy findings are essentially those of asphyxia. Recovery may be accompanied by signs of intense visceral congestion, such as hematemesis, hemoptysis, and hematuria. Electro-

cution is generally accompanied by severe local lesions. However, even fatal cases occur in which a local lesion is absent. These are due to low resistance at the point of contact, caused by moisture. The authors observed one non-fatal case involving the head in which bilateral cataracts developed within a period of two months.

The authors discuss the usual methods employed in industry for the prevention and treatment of electrical accidents, including instruction of the personnel in the performance of artificial respiration.

ALBERT F. DE GROAT, M.D.

Reid, M. R.: The Study of Wound Healing *Ann Surg.*, 1937, 105, 982.

The problem of wound healing is considered by many physicians as one of sepsis and antiseptics. However, there are other factors of basic importance in wound healing than bacteria. Reid re-emphasizes the clinical observations of earlier surgeons which are valid today.

Healthy tissue *per se* can inhibit and overcome bacterial contamination. Necrotic tissue and foreign débris impair the natural course of wound repair. This is best illustrated by the classic experiment of two aseptic wounds in one of which an excess of suture and strangulation of tissue is made, and in the second, traumatism and foreign material is restricted to a minimum.

Rest of the affected part is an important adjuvant in wound healing. This fact has been demonstrated in two animals, each one of which had a deep wound in one of the extremities. One animal was forced to exercise the affected limb by daily walks on a treadmill, whereas the extremity of the second animal was immobilized by a plaster cast. The wound in the latter healed more firmly and more rapidly than that in the first animal.

The maintenance of an efficient blood supply is essential to proper wound healing. This is best noted in older people with leg ulcers affected by peripheral vascular disease. Clinical emphasis must be directed to an improvement of the blood supply by rest, rather than the special antiseptic agent used locally over the ulcer.

Granulation tissue in wounds is an important asset of the repair process. It represents a barrier against bacterial invasion and toxin absorption. It is to be treated as a healing and protective agent rather than something undesirable, only to be cut away. Billroth has shown that in a granulating wound daily dressing with a putrid fluid has no serious or systemic effect, whereas a fresh wound dressed with the same putrid fluid gave a local inflammatory reaction and a toxic systemic effect. The physician who uses antiseptic agents for the wound must always bear in mind that these germicides have not only a destructive action on bacteria, but also affect living tissue in the same manner. The author believes that "all known forms of antiseptic drugs or cauterizations do more harm than good" in fresh wounds.

BENJAMIN G. P. SHAFIROFF, M.D.

Maes U Infections of the Dangerous Areas of the Face *Ann Surg*, 1937 106 1

The dangerous area of the face is the triangle which extends roughly from the angles of the mouth to the bridge of the nose and it is dangerous for anatomical and physiological reasons. These reasons include the thinness of the skin, its constant exposure to trauma, its rich vascular supply which provides a direct pathway from the surface to the interior of the cranium, the predominance in this area of connective tissue which adapts itself poorly to infection and the constant motion of the lips which militates against any localization of the infection.

Most important is the factor of trauma which is present in 90 per cent of all the cases and is introduced by the patient or physician or both.

The infecting agent is usually the staphylococcus. The spread is by way of the subcutaneous plexus and the angular and ophthalmic veins. The condition begins as a carbuncle or simple boil. When the factor of trauma is introduced, stagnant blood is provided as a rich culture medium for bacteria, the integrity of the protective leucocyte wall is destroyed, the infection spreads rapidly by way of the rich vascular supply and the steps of the pathological process include thrombophlebitis, thrombosis of the cavernous sinus, massive blood stream infection, meningitis and metastatic abscesses.

The brief course of the disease is characteristic. It begins with a mild local discomfort followed shortly by extensive swelling, edema and induration of the adjacent tissues. The symptoms and signs after this stage include severe pain, chills, fever, delirium or coma and prompt death. The diagnosis is obvious from the history and physical signs.

The condition is universally mistreated. All types of local and intravenous therapy have been advised but the general opinion now is that conservative measures, chiefly absolute rest of the parts, warm compresses and supportive measures give the best results, while surgical incision gives the worst. Ligation of the angular vein is theoretically correct but of little practical value and a few successful operations have been reported for drainage of the affected cavernous sinuses.

Twenty fatal cases of infections of the dangerous area of the face are reported to which are added 23 fatal cases of infection of other areas of the face not usually included in the dangerous area.

SAMUEL KAHN M D

Snodgrass W R and Anderson T. Prontosil in the Treatment of Erysipelas. *Brit M J* 1937 2 101

A series of 312 cases of erysipelas was treated under controlled conditions with (a) ultraviolet light (b) prontosil (c) ultraviolet light and prontosil or (d) scarlet fever antitoxin.

There was an even distribution of the individual cases in the treatment groups in respect to factors known to influence the course of the disease such as the duration of the disease before admission to the

hospital, the age of the patient, the severity of the infection and associated diseases.

The average dosage of prontosil was 5 gm and the average duration of prontosil treatment was two days. Treatment was given during the acute stages only and was not maintained after the subsidence of the local lesion and the cessation of fever and toxemia.

The cumulative evidence indicates that those cases which received prontosil treatment showed better results with regard to the duration of the spread of the local lesion, the duration of the primary pyrexia and the duration of the toxemia.

SAMUEL KAHN M D

Ramon G Bocage A Boivin A Mercier P and Others. Collected Results of Specific Antitoxin Therapy of Staphylococcus Infections. (*Résultats d'ensemble de l'antitoxithérapie spécifique des affections staphylococciques*). *Presse méd* Par 1937 45 889

The authors refer to a previous publication of theirs in *Presse méd* Par of July, 1935 in which they describe their first results with specific antitoxin in the treatment of staphylococcal infections. In that article they describe their methods in detail and give a bibliography. In a second report in *Presse méd* Par of February, 1936 they gave the results in 300 cases of their own plus 200 cases treated by colleagues to whom they supplied the antitoxin. Since February, 1936 they have accumulated 400 additional cases which are here reported together with reports from the world literature. In their own cases the method has been as follows:

A subcutaneous injection of 1/10 cu. cm is made as a test for sensitivity. Then at intervals of from five days to a week increasing doses of antitoxin were injected under the skin 1/4 c cm 1/2 c cm 1 c cm and 2 c cm, the last amount was repeated from one to several times. Their list of cases includes such conditions as acute and chronic furunculosis, acne, syphilis, eczema, sweat gland infection and carbuncle. Of the 400 cases 187 or 46 per cent were cured, 56 or 14 per cent were benefited and 57 or 14 per cent recurred or failed although some of the latter group were cured by further treatment. The authors conclude that these new cases confirm their previous view concerning the efficacy of this method.

Following their earlier reports other men began using the method and the following reports were found in the literature. Tzauck and his collaborators report 56 cases of cutaneous affections with three failures. Clement Simon reports that staphylococcal antitoxin is the best medicament which we now have against staphylococcal disease. Debré and his associates after a careful study of cases state that the results are on the whole very favorable and show themselves certainly superior to those of any other therapeutic method. Other reports of smaller groups of cases principally of cutaneous infections are given all very enthusiastic. The successful use of the method in acute and chronic osteomye-

litis, in staphylococcal septicemia, and in empyema have also been reported although in these types of lesions the response has not been as striking as in the cutaneous lesions.

From the French colonies, Riou and Bigot using antitoxin report from Tonkin that in 126 cases the results have been brilliant, and conclude "that in Tonkin, as in Europe, the antitoxin therapy constitutes the therapeutic method of choice in staphylococcal infections." From the Belgian Congo, Coulon reports 15 cases cured by antitoxin, with two recurrences which yielded to further treatment.

From Belgium, early reports on cases treated by small doses were not satisfactory, but after changing to a technique similar to the authors' and using larger doses, Nélis and Van Mechelen report on 65 cases with cure in 57 (88 per cent), improvement of the condition in 6 (9 per cent), and failure in 2 (3 per cent).

From Czechoslovakia, Klepetar reports good results.

From Italy, Carminetti reports 30 cases of abscess with 27 cures.

From England, Whitby using toxoid reports only mediocre results. Other reports from London show from mediocre to poor results. Likewise, Buchman in the United States using polyvalent toxoid reports poor results, as do several other American and Canadian authors.

Ramon and his collaborators believe that the poor results reported from America and England are due to the fact that the titre of the antitoxin was too low and the dosages too small, and that the good results reported from France, the French colonies, Belgium, and other European countries are due to better material used in larger doses. They predict that still better products can be made and that as this is done the results will improve further.

M. M. ZINNINGER, M.D.

Naulleau and Nedelec: Acute Streptococcal Myositis of the Pectoral Muscles and of the Latissimus Dorsi. Three Interventions and Delayed Healing in Three Months (Myosite aiguë streptococcique des muscles pectoraux et grand dorsal. Trois interventions. Guérison tardive au bout de trois mois). *Mém. l'Acad. de chir.*, Paris, 1937, 63, 857.

In a previous article Naulleau and Nedelec reported three cases of acute pneumococcal myositis localized in the temporal muscle.

This case refers to a fourteen-year-old boy whose illness had been diagnosed as a polymyositis of the pectoral and scapular region. This led to an acute streptococcal septicemia.

When seen at the hospital the patient complained of severe pain in the left scapular and mammary regions. Under general balsoform anesthesia, a submammary incision was made and the pectoralis major muscle was exposed. There were found purulent intramuscular foci, and a large amount of pus was drained from the under surface of the pectoralis major muscle. The muscle itself was found to be

thickened, edematous, and of a deep purple color. Inasmuch as no relief was obtained and the fever and pain persisted, antistreptococcal serotherapy was instituted but with little success. The tumefaction in the left dorsolumbar region persisted and fluctuation was present.

A second surgical intervention was attempted and the pectoralis minor muscle was found to be practically destroyed by the suppurative process. On exposure of the latissimus dorsi muscle a large number of small purulent foci were found. The individual muscle fibers of this muscle appeared dark red and edematous. The suppuration, however, did not extend beyond the limits of this muscle.

Histological examination of a fragment of muscle tissue revealed an acute inflammatory process with dissociation of the individual muscle fibers which were in part atrophied and in part replaced by a fibrillar tissue more or less infiltrated with leucocytes.

Inasmuch as the patient's condition grew worse because of a complicating hemorrhage and as the drainage was profuse, a third surgical intervention was attempted. During this operation the second, third, and fourth chondrosternal articulations were found to have undergone suppuration and there was a pathological dislocation of the corresponding costal cartilages. Following curettement of the foci and the introduction of iodoform drains, the patient made a slow but uneventful recovery.

In all probability the infection had taken its origin from an infected toe. The pathogenetic agent was the streptococcus. This type of infection is considered to be rare and its prognosis is especially unfavorable.

The course of the infection was characterized chiefly by a rapid onset, a severe reaction with suppuration of several muscles, and a long drawn-out course complicated by the suppuration of the chondrosternal joints and by secondary hemorrhage.

In discussing the treatment of this case, the author states that he was especially disappointed because of the poor results obtained from drainage. In general, the course of the process was slow, extending over a period of more than three months in spite of all therapeutic measures.

The question arises whether in similar cases radical resection of the involved muscles would yield better results. Although it is true that radical resection is the method of choice in these cases, this procedure would have been detrimental in this case.

RICHARD E. SOMMA, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Masmonteil, F.: A Surgical Block of Sterilizable Operating Cubicles (Bloc chirurgical à cellules opératoires stérilisables). *Rev. de chir.*, Paris, 1937, 56, 428.

Masmonteil states that need for operating cubicles, the air of which can be sterilized, is being recognized more and more widely. He describes a block of

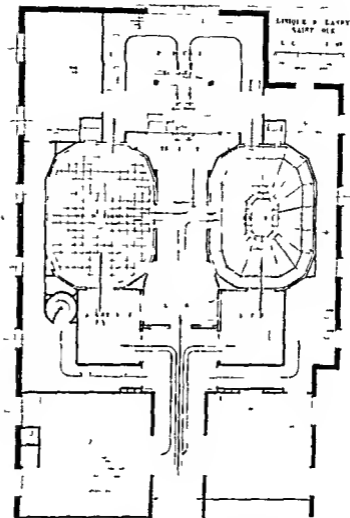


Fig. 1 Plan of the operating pavilion or block

operating rooms now in operation. The block consists of two operating cubicles each with its smaller cubicle for administering anesthesia. There is a vestibule extending the length of the entire block. The patient is taken to the anesthetic room and from there to the operating cubicle the surgeon enters the room at one side of the vestibule where he changes his street clothes and then goes to the lavatory where he sterilizes his hands and puts on his operating mask and gown. The doors between the lavatory, the anesthesia room and the operating room are sliding doors. In the lavatory the surgeon and his aides who are to enter the operating room are irradiated with ultraviolet light rays from 350 to 4000 wave length and the patient is irradiated with the same

light in the anesthesia cubicle. The anesthesia cubicles are painted in blue and lighted with blue light in these cubicles the nurses prepare the patient for operation and arrange the instruments for the surgeon's use so that they do not enter the operating cubicle only the anesthetist enters this cubicle with the patient. The operating cubicles are 6 by 4.5 meters and 2.5 meters high at the center, and 2.25 meters high at the periphery. This gives sufficient cubic capacity of air for five persons for an hour most operations last for a shorter period and the air is renewed after each operation by means of the ventilators. In the few operations that last longer than an hour filtered air is admitted through the ventilators to give a constant supply of fresh air. The ven-

tilators are so arranged that this can be done without producing any current of air around the operating table. The air is filtered and conditioned in an apparatus within the surgical block but outside of the operating cubicle. The operating cubicles are oval in shape, as this improves the circulation of the air and facilitates cleaning.

The floor of the operating cubicle is of large slabs of stone, separated by joints 1 cm wide which can be cleaned easily. The walls are double, with a space between the two parts containing radiators, the exterior part of this double wall is constructed of an insulating material, the interior part is duralumin, tinted electrically. The ceiling is of glass supported by metal. A circle of lights is in the ceiling, the rays of which are directed over the operating table by a concentrating prism, this gives the optimum degree of light without dazzling. To this lighting system is added an ultraviolet and an infra-red light. The former, with wave lengths of from 350 to 400 μ is used for irradiation of tuberculous peritonitis and for its general antiseptic effect in septic operations, the latter, for its effectiveness in reducing shock, as recommended by a number of surgeons in recent years.

The apparatus for the sterilization of dressings and instruments is also included in this block. The

walls of the surgeon's lavatory are largely of glass, so that he can observe the process of sterilization, and can also watch the preparation of the patient in the anesthesia cubicle. There is also a small laboratory in the block, where specimens can be examined during the operation, and the sections prepared for later study. At one side of the vestibule is a room for endoscopic examinations and the reduction of fractures under roentgenological control, from which the light can be shut off, there is a separate lavatory connected with this room. At the other side of the vestibule there is a room for the reception of the patient after operation, where he is under the care of surgical nurses until he regains consciousness.

The operating cubicles are cleaned and sterilized by the introduction of steam, which is condensed and removed so that there is no collection of fluid on the walls; and the air is renewed after each operation. After this procedure when the room was ready for operating, Petri dishes placed in various portions of the room have proved to be sterile, as no bacteria of any kind was obtained on cultures.

Measurements of the temperature and the humidity when the room was prepared for operation show the former to be 23.5° C, and the latter 48 per cent, which are regarded as conditions of "maximum comfort."

ALICE M. MYERS

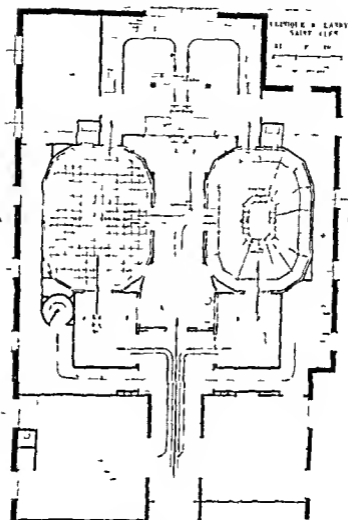


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Case, J. T.: A Comparison of Methods of Roentgen Examination of the Colon. *J Am M Ass*, 1937, 108 2028.

In this article the author has evaluated the various methods of roentgen examination of the colon. The examination should include both the opaque meal and a contrast enema with appropriate screen and film observations. The opaque or double contrast enema should be administered by the physician himself under screen control. Roentgenoscopy is greatly facilitated by the use of a fluororadiographic switch, such as that devised by the author, which permits the making of appropriate films under fluoroscopic control. If an obstructing colonic lesion is suspected, it is advisable to begin the study with an opaque enema. Umbrathor can be given orally in this type of case with safety.

The overlapping of the shadows of the rectum, sigmoid, and cecum frequently interferes with adequate study of the colon. Turning the patient into the oblique positions will, in most instances, bring these structures into profile and permit the making of adequate films under fluoroscopic control. The value of a study of the colon by films and the screen after expulsion of the opaque material is emphasized. This may reveal a localized enlargement of the bowel due to a bulging intraluminal tumor which has been hidden by the dense opaque material. Although the double contrast study is a time-consuming procedure and is probably not indicated as a routine practice in all cases, it is a very valuable method. By this method polypi and other lesions may often be visualized satisfactorily when other methods have failed. Care must be taken in the diagnosis of polypi as small gas bubbles in the third row of haustra or retained scybala may produce a similar appearance. It is often necessary to repeat the examination and note the persistence of these shadows.

It is apparent that no one method should be adopted as a fixed procedure in the examination of the colon. Each case should be considered a new problem and the method used which will best demonstrate the lesion or rule out pathology.

EARL E. BARTH, M D

RADIUM

Parsons, C. G.: Radium in the Treatment of Leukemia. *Brit J Radiol*, 1937, 10 573

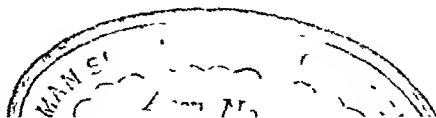
Irradiation in the treatment of chronic leukemia admittedly is the most effective means of relieving the patient's symptoms, reducing the size of the

spleen or glands, producing an improvement in the blood picture, and, by restoring a sense of physical fitness, increasing the working ability. Both roentgen rays and radium have been used to bring about these results, but there is no unanimity of opinion as to which of these agents is preferable, or whether there is a preference. In England there have been comparatively few detailed reports of radium therapy in the treatment of leukemia, and it is this scantiness of the literature which induced the author to record the findings in 16 cases of this nature treated in this manner.

Mention is made of the methods of application used by various other workers, and his own is described in detail. It consisted essentially of placing heavily filtered radium applicators over the splenic area for six hours over a period from a week to ten days, and giving doses varied according to the individual needs and controlled by daily blood counts. Exposure is stopped when the white-cell count reaches a total of 20,000 or 30,000, the amount depending on the rapidity of the fall of the leucocytes. Patients attend the hospital for a course of treatment, usually once a year, coming in whenever symptoms or blood counts suggest the onset of a relapse. Pure splenic irradiation is advocated because it is effective, simple, and offers as good a prognosis as other methods, according to available statistics.

Blood changes resulting from irradiation are discussed in a general way in cases with normal blood and also in those of chronic lymphatic and chronic myeloid leukemia. Changes noted in connection with 1 case of each of these varieties of leukemia in the author's series are tabulated in detail, and comments are made as to the relationship of the various changes to the irradiation. The case histories of all of the 16 cases are cited briefly. The results obtained are discussed at some length, as are also the selection of cases. Some of the factors suggested contra-indications to irradiation or discontinuance of same. The question of prognosis with special reference to the deductions made from the blood findings is also discussed. An attempt is made to evaluate the relative merits of radium and roentgen rays, and although the author makes no claim for real superiority of one over the other, he favors radium because the treatments, being less frequent, are preferred by the patients, unpleasant and dangerous reactions are both less severe and less constant, and this form of therapy is quite as effective in the relief of the symptoms as roentgen-irradiation.

ADOLPH HARTUNG, M D



PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Fray W W The Effect of Position on the Production of Cyst Like Shadows About the Shoulder Joint *Radiology* 1937 28 673

The shoulder joint being of the universal type, displays a wide range of motion in all three planes of space. The radiographic appearance will vary considerably with the position of the arm. The author studied these variations by taking a series of eighteen films of a normal shoulder through the full range of flexion and extension, abduction and adduction and internal and external rotation. Unusual positions were found to produce confusing shadows. A combination of internal rotation and forward flexion of the arm produces cyst like shadows at the upper end of the humerus because the face of the head is thrown downward toward the film (Figures 1 and 3).

For a routine study of the shoulder the author suggests an anteroposterior film with the arm placed in the anatomical position with the palm of the hand forward or in supination. This position avoids the production of confusing shadows and defines the bony structures with clarity except for the lesser tuberosity (Figure 2). The author describes various positions which may be used to show the lesser tuberosity, scapula and outer clavicle to best advantage. When the tube is focused 4 in. above the shoulder joint the head is thrown below the acromion process so that the joint is seen clearly but when the tube is focused 4 in. below the joint the acromioclavicular joint will be outlined exceptionally well.

EARL E BARTH M D



Fig 1 Anatomical basis for appearance of roentgenological shadows produced by combined movement of flexion and internal rotation. (Left) Humerus oriented at 45 forward flexion and 90 internal rotation. Note that the plane of the epiphyseal line (indicated by black line) lies parallel to the arm surface (indicated by white line). The head looks directly downward toward the film. (Right) A radio graph obtained with the central ray as shown by arrow. The articular margins of the head are cast upon the film as a circular shadow, the margins simulating the walls of a cyst. The epiphyseal line is absent. The margins of the greater and lesser tuberosity are superimposed upon those of the head to permit further confusion. This position of the arm is obtained whenever the arm is strapped across the chest in a Velpau bandage.



Fig 2 Anatomical position of the shoulder. The greater tuberosity is brought into full salience along the outer aspect of the upper humerus. The lesser tuberosity is seen distinctly due to its position on anterior aspect of the bone. The articular convexity faces upward and medially. The epiphyseal line forms an acute angle of 55-60° with the long axis of the shaft.



Fig 3 Effects of forward flexion (45°) and internal rotation (90°). The margins of upper humerus outline a cyst like shadow. The inferior border of this shadow is due to lower articular margin of the head its circular contour being distorted by the superimposed shadows of the outward flaring of the cortex of the greater tuberosity. Internal rotation and forward flexion alone are incapable of producing the typical shadow of a cyst, while the combined movement will produce such a shadow with great regularity.

Case, J. T.: A Comparison of Methods of Roentgen Examination of the Colon. *J Am M Ass*, 1937, 108 2028

In this article the author has evaluated the various methods of roentgen examination of the colon. The examination should include both the opaque meal and a contrast enema with appropriate screen and film observations. The opaque or double contrast enema should be administered by the physician himself under screen control. Roentgenoscopy is greatly facilitated by the use of a fluororadiographic switch, such as that devised by the author, which permits the making of appropriate films under fluoroscopic control. If an obstructing colonic lesion is suspected, it is advisable to begin the study with an opaque enema. Umbrathor can be given orally in this type of case with safety.

The overlapping of the shadows of the rectum, sigmoid, and cecum frequently interferes with adequate study of the colon. Turning the patient into the oblique positions will, in most instances, bring these structures into profile and permit the making of adequate films under fluoroscopic control. The value of a study of the colon by films and the screen after expulsion of the opaque material is emphasized. This may reveal a localized enlargement of the bowel due to a bulging intraluminal tumor which has been hidden by the dense opaque material. Although the double contrast study is a time-consuming procedure and is probably not indicated as a routine practice in all cases, it is a very valuable method. By this method polypi and other lesions may often be visualized satisfactorily when other methods have failed. Care must be taken in the diagnosis of polypi as small gas bubbles in the third row of haustra or retained scybala may produce a similar appearance. It is often necessary to repeat the examination and note the persistence of these shadows.

It is apparent that no one method should be adopted as a fixed procedure in the examination of the colon. Each case should be considered a new problem and the method used which will best demonstrate the lesion or rule out pathology.

EARL E. BARTH, M D

RADIUM

Parsons, C. G.: Radium in the Treatment of Leukemia. *Brit J Radiol*, 1937, 10 573

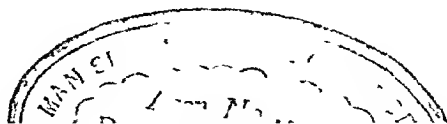
Irradiation in the treatment of chronic leukemia admittedly is the most effective means of relieving the patient's symptoms, reducing the size of the

spleen or glands, producing an improvement in the blood picture, and, by restoring a sense of physical fitness, increasing the working ability. Both roentgen rays and radium have been used to bring about these results, but there is no unanimity of opinion as to which of these agents is preferable, or whether there is a preference. In England there have been comparatively few detailed reports of radium therapy in the treatment of leukemia, and it is this scantiness of the literature which induced the author to record the findings in 16 cases of this nature treated in this manner.

Mention is made of the methods of application used by various other workers, and his own is described in detail. It consisted essentially of placing heavily filtered radium applicators over the splenic area for six hours over a period from a week to ten days, and giving doses varied according to the individual needs and controlled by daily blood counts. Exposure is stopped when the white-cell count reaches a total of 20,000 or 30,000, the amount depending on the rapidity of the fall of the leucocytes. Patients attend the hospital for a course of treatment, usually once a year, coming in whenever symptoms or blood counts suggest the onset of a relapse. Pure splenic irradiation is advocated because it is effective, simple, and offers as good a prognosis as other methods, according to available statistics.

Blood changes resulting from irradiation are discussed in a general way in cases with normal blood and also in those of chronic lymphatic and chronic myeloid leukemia. Changes noted in connection with 1 case of each of these varieties of leukemia in the author's series are tabulated in detail, and comments are made as to the relationship of the various changes to the irradiation. The case histories of all of the 16 cases are cited briefly. The results obtained are discussed at some length, as are also the selection of cases. Some of the factors suggested contra-indications to irradiation or discontinuance of same. The question of prognosis with special reference to the deductions made from the blood findings is also discussed. An attempt is made to evaluate the relative merits of radium and roentgen rays, and although the author makes no claim for real superiority of one over the other, he favors radium because the treatments, being less frequent, are preferred by the patients, unpleasant and dangerous reactions are both less severe and less constant, and this form of therapy is quite as effective in the relief of the symptoms as roentgen-irradiation.

ADOLPH HARTUNG, M D



MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Harkins H N and Roome N W. Concealed Hemorrhage Into Tissues and Its Relation to Traumatic Shock. *Arch Surg* 1937, 35, 130

The authors discuss the results of some of the experimental work on traumatic shock.

Brief reports are given on 10 cases of what is considered concealed hemorrhage with a table giving the measurements and method of arriving at conclusions in one and a table showing the changes in the blood concentration in another.

External hemorrhage has long been recognized as a cause of secondary surgical shock. Concealed hemorrhage into the body cavities and hollow organs has been recognized but is often not diagnosed but concealed hemorrhage into tissue spaces has not been universally considered as an important clinical cause of secondary shock.

Cases of concealed hemorrhage and extravasation of plasma into tissue spaces are presented. The resultant swelling is usually greater when measured quantitatively than casual physical examination would have led one to believe.

The extensive concealed hemorrhage and plasma extravasation in clinical cases substantiates the experimental observations of others that such local loss of fluid from the circulating blood stream is a factor of importance in the production of secondary surgical or traumatic shock.

CARL R. STENKE M.D.

Luthardt G E. *Clinical and Postoperative Conditions of Dermoid Cysts* (Ueber Knoch und postoperativen Befund bei Dermoidcystomeo) 1936 Leipzig Dissertation

According to present day knowledge the dermoid cysts are considered as teratoma i.e. congenital tumors which represent the derivatives of all three germinal layers located most frequently in the generative glands. According to the anatomical structure two types are distinguished to day and both are derivatives of all three germinal layers. First is the dermoid of cystic structure most frequently in the ovary consisting of mature tissue second there is the teratoblastoma of firm structure consisting of immature irregular and disarranged tissue more frequently found in the male generative glands than in the ovary. Clinically dermoids are always benign while teratoblastomas are malignant growing destructively forming metastases.

The authors' investigations concerned only the dermoid cysts round or oval formations with yellowish glossy skin averaging about a fist in size. The wall consists of epidermis with papillary connective tissue. The substance resembles grit like pulp with cholesterol and detritus and matted hair

On one side of the wall of the dermoid process extending into the cavity the surface is covered with pavement epithelium. It contains an abundance of sweat glands, bone cartilage fat and connective tissue sometimes rudimentary organs such as rudiments of eyes, pieces of intestine or of jaw. Moreover, there are dermoids consisting chiefly of thyroid gland tissue or struma ovarii. There is a lack of liver tissue and of pancreatic tissue and nearly always of parts of the genital organs. Now and then one finds a number of regularly formed globules which developed from the pulp through mechanical processes. There are two views pertaining to the origin of dermoid cysts: (1) they are considered to be rudimentary fetuses originating in the egg cell, and (2) they are believed to be blastomeres according to the theory of Marchand and Bonnet. Their origin can be traced back to a prolonged division of one or more blastomeres in a previous segmentation process.

In the period from 1928 to 1932 15,000 women received treatment 826 (6 per cent) were operated upon for ovarian tumors. Among these 72 (8.7 per cent) presented dermoid cysts which appeared preponderantly during the age of sexual maturity, especially between the years of twenty and thirty the youngest at sixteen years and the oldest at fifty nine. The most common complaints were pains in the abdomen and in the back and menstrual disturbances occurred in one third of the cases. In 86 per cent of the cases the tumor was to one side in 50 per cent to the right and in 36 per cent to the left the location of the tumors in reference to the uterus was anterior twice as often as posterior. There were no multiple cysts. Twisting of the pedicle occurred in 13.6 per cent the highest degree of torsion being 720°.

The fertility is somewhat reduced if one considers that 10 per cent of the marriages are sterile. In 84 per cent of the cases of married women a conception took place. There is present a moderately increased disposition to abortion 18 of the 44 married women had a total of 35 abortions.

In the treatment only operation is to be taken into consideration. A confinement of fourteen days in the clinic is required. Primary cure is effected in 80 per cent of the cases. Primary mortality occurred in 4 per cent an abundance of ovarian tissue was retained.

The following were the complications with other diseases of the genital organs: uterine myomatosis 10, 12 per cent, pseudomucous cysts in 6 per cent, carcinoma of the uterus in 2.7 per cent and carcinoma of the portio in 1.3 per cent. Simultaneous pregnancy existed in 7 per cent. A suppurative of a dermoid cyst is not very frequent.

There follows a report on a case of a dermoid in the rectum. A bunch of hair was seen protruding out of the rectum about 8 cm deep in the left pos-

terior rectal wall there was an aperture nearly as large as a dime, through which the plainly visible tuft of hair could be easily removed by twisting. Treatment consisted of flushing the intestine. The opening in the rectal wall eventually closed and left a facet-like scar.

Rupture into the urinary bladder is quite frequent, and painful bladder disturbances follow. In spite of a prolonged discharge of pus, there is no cystitis. A rupture into the vagina is less frequent, as well as rupture through the abdominal walls with the discharge of hair and teeth through the fistula.

Sixty per cent of all the patients had no complaints. The scars were firm, without reaction, and there was no hernia. The postoperative fertility was 27 per cent, of 22 women, 6 gave birth to children. Relapse occurred in 5.4 per cent. There was not a single case of malignant degeneration.

(ERICH HEMPEL) CLARENCE C REED, M D

Bartsch, G. H. Lipophagic Granuloma (Ueber lipophage Granulome). *Beitr z klin Chir*, 1937, 165 487

Since the conclusion of his first work on the same subject (*Arch. f. klin. Chir.*, 1934, 178: 179) Bartsch investigated 7 additional cases of lipophagic granuloma. The parts affected were as follows: the female mammary glands in 3 cases, the forearm and the bone marrow in 1 case each. In 2 cases it was a question of secondary findings in operations for rupture.

Following an extensive presentation of the available literature, there is a report of the author's observations, as well as of Angerer's animal experiments, which were conducted to determine the effect of Vienna's gas edema on guinea pigs. Bartsch had the opportunity of observing the formation of lipophagic granuloma in these animals. He found a clear outline of a picture of the disease in question in 3 animals.

Lipophagic granulomas are local resorptive formations of granulation tissue which grow more or less together with their surroundings on the ground of localized fat necrosis, and develop as hard nodules or tubercles, mostly with an oily content in the cavities, they appear as white wax-like structures with infrequent wide, firm formations of connective tissue. They are usually found in the female breast, and only occasionally in the bones and subcutaneous tissue. Microscopically they are characterized by extensive granulation tissue, inflammatory cells, fat-storing cells, multinucleated foreign-body giant cells and by a tuft-like or glandular infiltration of soapy lime crystals.

Trauma cannot always be considered as their cause, as previously determined by Abrikosoff; secondary inflammatory origin is a possible factor. Clinically, on account of their immobility and adhesions, lipophagic granulomas are often confused with malignant tumors. To avoid such an error, an exploratory excision for the purpose of microscopic clarification is necessary.

Therapeutically, there is the question of operative removal and, in a prolonged attack, also the removal of the mammary glands. In case of small tubercles and a clearer diagnosis, there is a possibility of spontaneous absorption, which however did not occur after ten years of waiting.

In expressing an expert opinion, it is important above all to consider the posttraumatic origin which, on account of protracted development and small traumatic influences, is difficult to prove. Neurological pains are to be attributed to the infiltrates about the nerves of subcutaneous tissue.

(WERNER BLOCK) CLARENCE C REED, M D

Cameron, A. T., and Meltzer, S.: The Effects of Certain Diets on the Production of Tar Carcinoma in Mice. *Am J Cancer*, 1937, 30 55

A considerable amount of work has been done on vitamins in connection with various types of transmissible tumors. While in general, experiments with a diet rich in vitamin content tended to show anticarcinogenic properties for this diet, other experiments produced results not only confusing but contradictory.

The experiments of Mellanby and Watson on tarred mice, and those of Bittner on mammary carcinoma in mice tend to show that a diet which benefits growth of the animal also accelerates growth of its tumor. Conversely, a diet unfavorable to the animal's general condition also affects the growth of its tumor unfavorably. In other words, what is good for an animal is also good for its tumor.

Other experiments showed exceptions to this general rule. Watson and Mellanby observed that a diet rich in butter or in fresh liver showed carcinogenic properties when given to tarred mice. They found also that the anti-anemic factor of the liver was not responsible for this effect. Another investigator, Oike, observed that a diet rich in brain, albumin, and Vitamin B protected rabbits against tar carcinoma. On the other hand, a diet high in fat, regardless of its vitamin content, led rapidly to carcinoma and death. Maisin and Pourbaix showed that aqueous extracts of liver, pancreas, and intestinal mucosa added to the diet of tarred mice promoted the development of carcinoma, but additions of ether extracts of brain, thymus, and bone marrow had an inhibiting influence. Freund and Lustig in their experiments observed that a diet rich in olein and protein but poor in carbohydrate inhibited, while a diet rich in carbohydrate and palmitin but poor in protein and olein favored, the development of tar carcinoma.

In 1934 and 1935 Davidson of Winnipeg published two papers showing the contrast in effect of two very different diets on the development of tar carcinoma in mice. He observed that with diets deficient in Vitamin E somewhat similar effects in diminished reproductive capacity and general condition of mice bearing carcinomatous growths were obtained. Therefore, he determined to ascertain whether a diet rich in this vitamin would have an

inhibitory effect on the development of carcinoma following tarring. Several experiments which he carried out with comparable groups of young animals led him to conclude that animals on the high vitamin diet remained in good health longer and tended to develop carcinoma later and with less frequency than the animals on the low vitamin diet. The high vitamin diet seemed to increase the resistance of mice to the carcinogenic factors in tar.

Late in 1934 the Medical Research Committee of the University of Manitoba decided to repeat Davidson's experiments as nearly as possible. This set of experiments was undertaken by Cameron and Meltzer. In part they confirmed Davidson's results with two wholly different diets. They used the identical diets and followed the same procedures that Davidson had employed with the exception that isolation of the mice in separate cages was decided upon in order to permit more complete dietary control and also prevent the additional complication of trauma from fighting. A further test was carried out to determine what effect the same two diets in the experimental animals would produce in the absence of tarring. In a subsidiary test certain synthetic diets were studied in order to ascertain which if any of the vitamins B₁, B₂, and E was responsible for the apparent difference produced by the two diets.

The two diets were referred to as the good or anti carcinogenic diet and the bad or carcinogenic. The good diet consisted of wheat germ cereal with a little wheat germ oil added to it, unlimited lettuce, the green parts of the leaves only, and fresh milk. The bad diet was made up of bread spread with lard, chopped oats, vegetables, carrots or turnips and, fresh milk. From the experiments Cameron and Meltzer determined that the development of the growths tended to be somewhat later with one diet than with the other, though it would be equally true to state that the development of the growths tended to be somewhat earlier with the second diet than with the first. On the other hand there was no significant difference between the two diets in the final proportion of animals developing malignant growths. Incidentally the authors state neither of these diets can be regarded as normal for mice.

Therefore the results of Cameron and Meltzer gave no support to Davidson's thesis that a diet rich in certain vitamins decreases the incidence of carcinoma in tarred mice. The effect noted does not

seem to be specific. The anti carcinogenic diet tends to produce a slightly heavier animal which shows increased resistance to toxic agents and to heat. Furthermore the cause of the delayed carcinogenesis does not appear to be an excess of vitamins B₁, B₂, or E. The authors point out also that the two diets were markedly different in protein and salt contents and in that of linoleic acid and probably similar unsaturated fatty acids. The possibilities due to such differences were not mentioned by Cameron and Meltzer. The results of Vassia and Pourhaix, however, suggest that there may be a lipid factor of importance. Further experiments with controlled synthetic diets may ultimately bring about results of great value.

MATTHIAS J. SEIFERT, M.D.

Burke E. M. Metastases in Squamous Cell Carcinoma. *Am J Cancer* 1937 30 493

In a group of 440 autopsies performed at the State Institute for the Study of Malignant Diseases at Buffalo on patients who died from a malignant lesion a series of 186 cases was found in which the primary growth arose from squamous epithelium. These cases were divided into two groups: those in which distant metastases occurred and those which remained localized. The involvement of regional lymph nodes or invasion of surrounding structures by direct extension being considered a localized lesion. Metastatic lesions were found in 37 per cent of this series of 186 carcinomas arising in squamous epithelium, a greater frequency than is usually reported. Males are more apt to have malignant lesions in squamous epithelium than females. Only a small group of the cases had a history of carcinoma in the family or a positive Wassermann reaction. Such factors as duration of the disease and site of the primary lesion seemed to have little or no bearing upon the production of distant metastases.

Histological grading of the primary tumor showed the majority of cases in which distant metastases occurred to belong to the more malignant groups. Some primary locations are more prolific in the formation of distant metastases than others. The lungs and liver are, as a rule, the major recipients of metastatic implants and the adrenals and bones are affected to lesser degree. It was noted that a metastatic lesion was very consistent as to its grading with the primary lesion, an anaplastic tumor usually appearing in the metastatic lesion as an anaplastic growth.

JOSEPH G. NARAT, M.D.

INTERNATIONAL ABSTRACT OF SURGERY

FEBRUARY, 1938

PRINCIPLES OF SURGICAL PRACTICE THE CARE OF INFECTED WOUNDS

SUMNER L. KOCH, M D, F A C S, Chicago, Illinois

WERE it possible to have a survey by a competent expert of the surgical department of any large general hospital I am convinced that every one of us would be startled and dismayed by the waste resulting from inefficient care of patients with infected wounds. If one could estimate the needless loss of time, effort, surgical dressings, hospital days, and all the expense they represent for hospital or patient, and, still more important, the loss of time and function sustained by individuals who can ill afford to lose either of them, we might well conclude that our pride in the accomplishments of modern surgery was not entirely justified.

A single example may serve to emphasize these facts:

A sixty-year-old woman with acute swelling and pain over the dorsum of the hand was taken to a private hospital of excellent reputation. Warm wet dressings were applied for twenty-four hours, but because the pain continued and because "the relatives insisted that something be done" the chief surgeon of the hospital was called and several incisions were made over the dorsum of the hand. No localized infection was found, but "after about three days the pus came." Several days later more incisions were made—in the palm, and on both volar and dorsal surfaces of the forearm, and again "after several days the pus came."

When I saw the patient six weeks after admission to the hospital the arm lay on a pillow enveloped from fingers to axilla in a heavy rubber sheet. Under the rubber sheet was a covering of blanket, and within the blanket moist gauze wound round and round the extremity. The nurse removed the rubber sheet and blanket and then, while the patient feebly held the extremity aloft, unwound some 5 yards of wet, pus soaked gauze.

The arm was a pitiable sight—pus, necrotic tendons, sloughing macerated tissue, in places bare bone exposed, and for weeks it had been treated once daily by removing the dressing, wrapping it in sterile gauze but without any effort to keep the gauze sterile, and then thoroughly soaking the gauze with boric solution. Outside the final cover-

ing of rubber sheet a heat cradle was sometimes applied, with what idea it would be hard to surmise, for there was no possibility of the heat penetrating the multiple coverings of cold, wet rubber, blanket, and gauze.

After three weeks more of exacting care the patient was able to leave the hospital with an almost healed but practically useless hand and forearm. She had paid \$7.00 a day for her room and \$14.00 a day for two special nurses, more than \$1,300.00 for those items alone. She had spent nine miserable weeks in the hospital and left it with a stiff and immobile claw-like extremity.

Perhaps you will say, "This is obviously a glaring example of mismanagement and neglect, and it is quite unfair to draw conclusions from isolated cases such as this." An increasing experience impels me to believe that such cases are not uncommon, and that with little effort one would find far too many similar instances.

Who is responsible? First of all, we, ourselves, who are teachers in medical schools. We have become interested in special fields of surgical work and too often have forgotten that basic principles of surgery must be emphasized quarter after quarter, and year after year if succeeding generations are to be well grounded in surgical practice. Secondly, the attending surgeons in our general hospitals, who have become fascinated by operative surgery, and delegated the care of less interesting patients to assistants with insufficient training or to house officers just awakening to a realization of their limitations. Thirdly, the great body of general surgeons, who have secured their education and training under the first and second groups and are simply practicing surgery as they were taught. Fourthly, and with much less blame, the house officers and interns, who with rare exceptions follow the paths marked out for them, and too often refuse to accept the logical conclusions of their own observations. Finally, commercial organizations, whose detail men form



Fig. 1. Aluminum splint for maintaining hand and fingers in the position of function. It can be sterilized and incorporated in the dressings during the stage of acute inflammation. It can be covered with felt and provided with straps for easy application and removal during the stage of convalescence.

an influential body of therapists and whose 'teaching' is often accepted without question because their methods seem to offer an easy and royal road to the solution of troublesome problems.

What are the principles involved in the treatment of infected wounds? They are simple, and based on well established physiological and pathological observations. One must accomplish:

- 1 Localization of the infection
- 2 Drainage when the infection is localized
- 3 Sterilization of the infected area
- 4 Covering of the raw surface if loss of superficial tissue has taken place or obliteration of the cavity if the infection resulted in abscess formation
- 5 Restoration of function

LOCALIZATION OF THE INFECTION

In attempting to secure localization of an acute spreading infection the surgeon may well take his cue from the process which man has developed during many centuries of struggling for existence, i.e., the process of inflammation. This defensive reaction to injury consists first of all in an active

hyperemia, which is soon followed by passive hyperemia because the venous return becomes inadequate to care for the increased amount of blood coming to the part. Nature attempts first of all to bring as much blood as possible to the affected part—to flood it with white cells: phagocytes, antibodies, nutritive blood serum and oxygen carrying red cells. In other words, to wall off the injured area with white blood cells, to attack the invading organisms with phagocytes, to neutralize the toxins given off by the bacteria and to maintain at the highest possible activity the metabolism of the tissues involved. Since every movement of the inflamed tissue causes pain the part is kept absolutely at rest. The surgeon can best help his patient by furthering and not thwarting these normal defensive measures.

In increasing the blood supply to an infected area nothing is more effective than the application of warm, moist dressings. Elevation of the affected part, by bringing the assistance of gravity to the venous circulation, assists in the elimination of waste products and in preventing passive congestion at the site of injury. One cannot dismiss the subject of warm moist dressings, however,

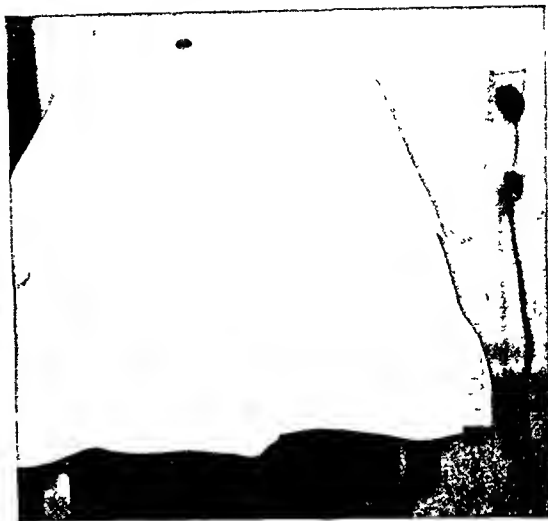
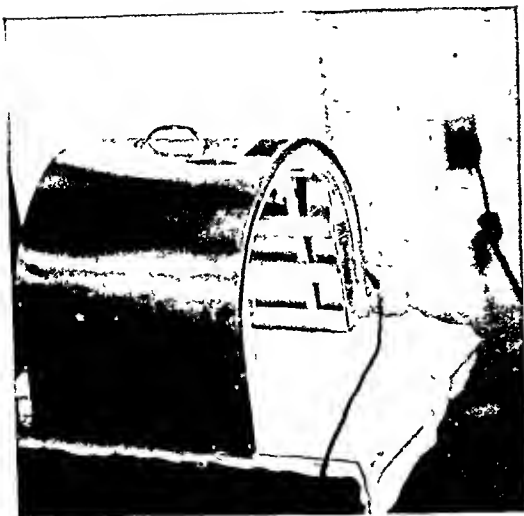


Fig 2 Electric baker for maintaining constant heat over an extremity in which one wishes to produce an active hyperemia. The baker must be covered so that currents of air passing through it do not lower the temperature.

with the statement that they afford the most effective method of producing a local hyperemia. To be continuously effective wet dressings must be *kept warm*, and at the same time the patient must not be required to lie on wet sheets and a wet bed. A common method of applying warm, moist dressings consists in wringing out hot cloths or pads in a hand roller and applying them with bare fingers to the area to be covered. Such a method is wasteful of dressings, it furnishes frequent opportunities for secondary contamination of the wound, the dressings remain warm for only a brief interval. If they are changed every three or four hours, during the greater part of the time they are *cold wet* dressings which are uncomfortable for the patient and which may actually lower the vitality of the tissues by reason of the lowered temperature of the part caused by the rapid evaporation of moisture.¹

We believe as a result of long observation that one must depend on an external source of constant and unvarying heat if one wishes to keep a moist dressing warm. This can be accomplished by putting a large sterile dressing about the affected part, moistening it—not saturating it—with a warm, sterile solution, such as boric or salt solution or plain sterile water, and suspending

¹It has always seemed entirely illogical to apply cold applications or an ice bag to an inflamed area. Cold causes contraction of the blood vessels, diminishes the blood supply, and lowers the metabolism of the affected area. All three factors favor the development of infection. The fact that cold has an analgesic effect cannot compensate for the lowered vitality of the tissues. It is our firm belief that cold has not a helpful, but rather a harmful effect in the treatment of an acute spreading infection.

over it a powerful light, an infra-red light, or a cradle heated with bulbs or a resistance coil. Every few hours the outside covering of the dressing is opened just enough to permit moistening it with the warm solution. Once in twenty-four hours the dressings are completely removed and replaced, with the same careful attention to aseptic technique as when they were first applied. The inclusion of a light, sterilized aluminum splint within the dressings helps to provide the rest which is so important a factor in the successful treatment.

Continuous warm, moist dressings should not be applied indefinitely. If the part becomes edematous and water-logged and the skin becomes soft and macerated, persistence in such treatment hinders instead of hastens healing by reason of the passive congestion produced, the subsequent strangulation of tissue cells, and the resulting necrosis. To prevent such a complication after localization is well under way one can substitute intermittent application of moist heat for continuous application, and between treatments dry the part thoroughly and so diminish congestion. If the affected part is the hand or the upper extremity it is soaked in a sterile arm bath once or twice daily. At the end of fifteen or twenty minutes it is laid on a sterile towel and thoroughly dried for a half hour under an electric light or in the sunlight. Finally a single moist dressing covered with dry dressings, and a light splint to provide rest and support are applied to



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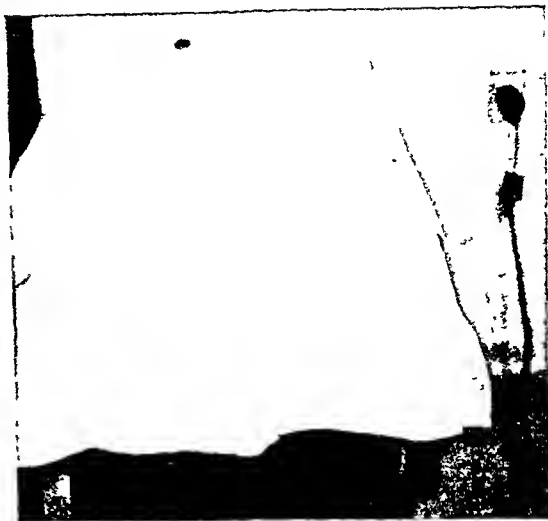
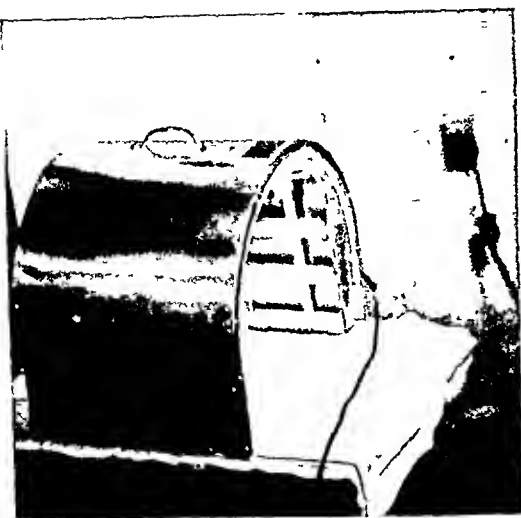


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Fig. 3 Acute lymphangitis of forearm and arm. The telltale red lines outlining superficial lymphatic channels are always signals of danger of a violent and rapidly spreading infection

the affected part. Such a method substitutes an intermittent active hyperemia for constant hyperemia; the use of the arm bath permits cleansing of the part and aids in the elimination of wound secretion and dead superficial tissue; thorough drying helps to dehydrate the congested tissues and prevent edema. After the infection is under control, gentle movement while the affected part is being dried not only aids the venous return but helps to prevent the stiffness of muscles and joints which develops so rapidly in constantly immobilized limbs in which infection is present.

If a specific antitoxin for the infectious agent is available as in tetanus, diphtheria, and infection due to *Bacillus welchii* (*aerogenes capsulatus*), it is of definite value. It is our belief that x-ray treatment is also of value, and our first step in the treatment of a patient with an acute spreading infection is to ask that a half erythema dose be given over the affected area. Concerning the efficacy of polyvalent vaccines and of serum therapy one can only say that their value is still undetermined. Blood transfusion from an immunized donor seems to us the one method of combating infection from without that is theoretically sound. The present impracticability of the method for use in the great majority of cases is obvious both because of the difficulty and time required to determine the type and strain of the infecting organism and because of the large number of strains which can produce the same clinical picture. To give a patient with a virulent streptococcal infection serum from a patient convalescing from scarlet fever in the hope of providing specific antibodies is to ignore the fact that immunity against one strain of streptococcus may fail entirely to protect an individual against many other strains of streptococcus; any one of which may be the etiological factor in his illness.

During the past few years high hopes have been aroused that a chemical agent has been discovered capable of exerting a specific effect upon many strains of streptococcus and many encouraging reports have appeared concerning

the favorable results of sulphanilamide therapy. Sufficient time has not yet elapsed nor sufficient evidence accumulated to make it possible to reach definite conclusions as to its value or as to the possible harmful effects that may result from its use.

The general treatment of an acute spreading infection consists essentially of rest in bed, maintenance of maximum fluid intake, of adequate elimination, and an easily assimilable and nutritious diet.

Four specific types of acute spreading infection deserve particular mention: (1) acute lymphangitis, (2) acute thrombophlebitis, (3) infections about the face, nose and lip, and (4) infections about the teeth. The presence of red streaks running up the forearm or up the leg or extending from a furuncle on the hip, buttock or back are danger signals—warnings of an acute fulminant infection, usually of the streptococcal type, that spreads into tissue spaces and other lymphatics with lightning-like rapidity; the moment such tissue spaces are opened with a knife. Simply to incise a blister or subcutaneous area of discoloration in such cases may lead to a severe chill, sharp rise of temperature and marked symptoms of exacerbation of infection. If so slight a trauma can cause such startling results it is obvious what the results of an exploratory incision may be.

With an acute thrombophlebitis the danger of a rapidly developing septicopyemia is manifest. In spite of many attempts to treat such cases by ligation or extirpation of veins proximal to the site of infection, we believe that the consensus of the best surgical opinion condemns such a procedure and justly so, for such an infection does not travel only by one route but by many anastomosing channels, nor is it entirely intravenous for there is phlebitis as well which cannot be affected simply by shutting off the lumen of the vein.

With infections about the face, nose, and lip Blair has epitomized the whole subject when he says that he has never seen a fatal result in a case treated conservatively by non-operative measures, that is which has not been pinched, injected, incised or otherwise traumatized either by the patient or surgeon and that every fatal case that has come under his observation has been subjected to some one of the above procedures. This condemnation of surgical interference does not apply to well developed abscesses in which there has been sufficient time for the development of a protective surrounding wall nor to the destruction of the whole infected area by the use of an actual cautery. Blair has also helped to prevent

many serious infections by his warning not to pull the tooth in the presence of acute inflammation, but to wait for localization before attempting any active surgical treatment

In contrast with the four groups of cases mentioned in which early surgical interference is contra-indicated is one group of cases in which early surgical interference is imperative if good results are to be obtained, viz., that group of cases in which infections with the organisms of gas gangrene have occurred. Fortunately such infections are not common in civil surgery, and yet one should never forget the possibility of their occurrence. The early symptoms—a foul smelling discharge from a wound which in the early stages may look perfectly innocuous, brownish discoloration of the wound edges, and a greenish yellow mottling of the skin about and above the wound, which resembles that seen some days after an extravasation of blood has occurred in the subcutaneous tissues—should immediately suggest the necessity of microscopic examination of the wound secretion, and if that is inconclusive, of a bacteriological culture. To wait until gas can be expressed from the wound edges and until crepitus can be felt is to lose the opportunity of saving a limb and perhaps a life.

The surgical treatment is excision of the wound, which may mean excision of an entire muscle or of a group of muscles; systematic irrigation with Dakin's solution of the wound left widely open, and the administration of anti-gas-gangrene serum.¹ The value of x-ray treatment as well has been demonstrated by convincing clinical observations

DRAINAGE

When an infection becomes localized it constitutes an abscess. To drain a localized accumulation of pus is one of the oldest axioms in surgery. It should also be axiomatic that the more severe the infection the more cautious one should be in incising it. The inexperienced surgeon is often surprised to find a thick wall of edematous tissue overlying the abscess cavity he thought was just underneath the surface, and dismayed at the reaction, the chill and sharp rise of temperature that follow his operative procedure. A safe rule is to make certain that localization of an acute spreading infection has occurred, and then wait a little longer before draining it.

Another, the first, axiom of surgery is "Do no harm." In connection with the drainage of an abscess this means to us

¹The majority of commercial antitoxins are effective against bacillus welchii only. Others are effective against bacillus welchii, vibrio septique, and bacillus tetani.

"Do not devitalize tissues which are struggling for life by infiltrating them with a local anesthetic and so diminish still more their failing blood supply.

"Do not make their recovery impossible by congealing them with a freezing anesthetic

"Do not traumatize them by blunt dissection, by forceful retraction, and by crushing forceps"

For some reason, difficult to understand, the surgeon who opens an abscess often seems to feel that speed is essential to success. He cuts rapidly, with little regard for fragile tissue. He plunges a blunt forceps deeply into the infected area, then enlarges the opening with powerful fingers. It is little wonder that the patient often responds with a chill, a sharp rise of temperature, and not seldom—especially if the operative attack has been on bone—with the formation of other centers of infection at a distance.

Usually after drainage is instituted the warm wet dressing is continued for a few days to maintain the hyperemia. It should not be continued to the point of maceration and necrosis of superficial tissues. The "drain," which has usually been inserted at operation, should be removed within forty-eight hours, and *should not be replaced*. There is no more certain way of introducing additional infection into an open wound than by repeated reinsertion of a drain. If the incision is adequate and correctly placed drainage will continue as long as exudation is present, if it is not, insertion of a drain will not compensate for the error.

Mechanical methods of facilitating drainage—for example, irrigation with various solutions—are of doubtful value. Only one method is of proved value, the use of Dakin's solution, and its value depends upon its ability to oxidize necrotic tissue without injuring living tissue, and so helping to rid the abscess cavity of the necrotic tissue, which is so important a factor in delaying sterilization.

If the infected area is a superficial one—such as the raw surface resulting from a severe burn—it still needs drainage. It can be accomplished with the aid of wet dressings changed sufficiently often to prevent retention of the wound secretion. Dry dressings favor coagulation of the pus and the formation of a warm culture chamber which provides ideal conditions for bacterial growth.

STERILIZATION OF THE WOUND AREA

Sterilization of the wound area must take place before healing can proceed with any degree of rapidity. The most important single factor in hastening sterilization is *simple cleanliness*. To

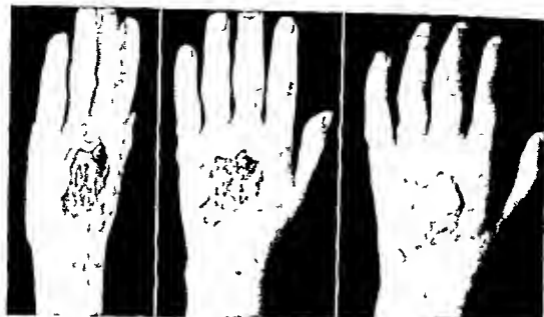


FIG. 4 a b Open wound with exposure of extensor tendons resulting from destruction of tissue following an acute spreading infection c Result fourteen days after application of a single graft of intermediate thickness over granulating wound Although the tendons were not quite completely covered with granulation tissue practically no loss of the graft occurred

permit macerated epithelium encrusted wound secretion and coagulated blood to cover skin edges and the area about the wound is to provide favorable conditions for bacterial growth Too often the surgeon satisfies his conscience by pouring an antiseptic solution over the wound area day after day, and convinces himself that he is "treating" the infection We have not infrequently seen patients with infected wounds who three weeks after an injury and the infection which followed it still carried on the skin around the wound the red or blue or yellow stain of the antiseptic solution which was applied to sterilize the skin immediately after injury What Vernon David has often referred to as simple soap and water cleanliness should be the first article in the surgeon's credo when he considers the treatment of infected wounds

The second essential is at the earliest possible moment to get rid of the necrotic tissue which forms so excellent a culture medium for bacterial growth The shaggy wall of an abscess cavity and the coagulum of pus that clings to it, and the blackened leathery skin and subcutaneous tissue that mark the destructive effect of a burn harbor large numbers of bacteria One has only to note the change in the appearance and odor of the

wound shortly after the necrotic slough separates from the injured area to be convinced of the fact that a sudden and definite improvement has taken place

As has been said, the value of Dakin's solution depends upon its power to liquefy and oxidize necrotic tissue without injuring living tissue If correctly used it can aid very greatly in hastening the "chemical debridement" which usually can not be carried out with the knife without the risk of cutting through nature's defensive wall or of sacrificing living tissue If the infected area is beneath the surface this chemical debridement is the only method we have at our command for hastening the separation and solution of necrotic tissue In patients with appendiceal abscess we formerly permitted the wound to drain until healing took place Of late years in such cases we have gently inserted a soft rubber catheter into the depth of the wound on the fifth or sixth post-operative day and irrigated the wound through the tube every three hours with Dakin's solution The result invariably has been that within from 7 to 10 days the thick foul smelling wound discharge has become thin mucoid and odorless and the period of healing has been definitely shortened A similar technique in other types of ab-

scess—bone abscesses, empyema, and deep abscesses of soft tissue—and in large superficial wounds with sloughing necrotic tissue has brought about sterilization much more promptly than when the abscess cavities and open wounds were left to drain until spontaneous sterilization took place

If wound secretion does not diminish and the phenomena of inflammation do not recede under the simple plan of treatment described one must consider the possibility of an unusual type of infection or of an underlying systemic disease. A symbiotic infection, such as follows human bites, an infection due to the micro-aerophilic hemolytic streptococcus of Meleney, tularemia, diabetes, or a coincident luetic infection all require specific treatment. Unless the surgeon remembers the possibility of such complications and rules them out in cases which do not show a prompt response to simple cleanly treatment he may fail completely to achieve the desired result

COVERING OF THE RAW SURFACE OBLITERATION OF THE ABSCESS CAVITY

As sterilization of the wound area takes place the raw surface rapidly assumes a healthier appearance. Wound discharge lessens, granulations become red and healthy. During this period healing can be favored by applying directly over the wound surface gauze of so fine a mesh that granulation tissue cannot grow into it and be torn away with each change of dressing. A second helpful factor, as often emphasized by Blair and his associates, is the application of firm pressure to the raw surface by means of sea sponges bandaged over the outside of the dressing. Such pressure, as many surgeons have demonstrated to their satisfaction, prevents passive congestion of granulation tissue, and by improving the circulation stimulates wound healing. Pale and flabby granulations can be converted into firm and red ones within a week's time by simply adding to cleanly treatment some method of applying pressure over the wound area. If, on the other hand, evuberant granulation tissue is destroyed with silver nitrate or some other caustic, nature's effort at healing is simply thwarted until the damage can be repaired.

When the raw surface is surgically clean, as evidenced particularly by its healthy appearance and by the absence of bacteria from smears taken from the wound, if larger than a silver quarter it should be covered with a skin graft. Time can be saved, scar-tissue formation lessened, contractures prevented, and the ever present danger of reinfection eliminated by covering such raw surfaces with skin grafts at the earliest possible

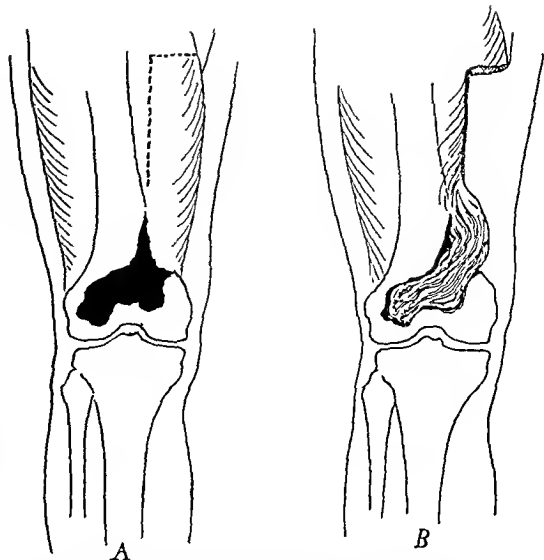


Fig 5 Method of obliterating cavity in bone, close to a joint, with a pedunculated flap of living tissue (After Kanavel)

moment. With extensive raw surfaces, such as are present after burns and crushing injuries, this consideration is of particular importance. With care and skilful treatment the average time of convalescence in such cases can be measured in weeks instead of in months.

Deep Infections Just as the treatment of a superficial raw surface depends upon drainage, cleanliness, and prompt closure of the open wound, so the successful treatment of an abscess depends upon drainage, sterilization of the abscess cavity, and obliteration of the cavity. If the first is adequately carried out, nature unaided so frequently accomplishes the second and third steps that the surgeon forgets their importance or even fails to realize that they have been accomplished. With abscesses of the soft parts and with appendiceal and other intra-abdominal abscesses it is unusual for the cavity to persist if sterilization has been assured and all foreign bodies have been removed.¹ With abscesses of the soft tissues the outer wall simply collapses. The normal intra-abdominal pressure is a potent factor in bringing about rapid obliteration of an abscess cavity within the abdomen. If, however, the cavity has rigid external walls, as in the case of bone abscess, if in addition there is a soft yielding inner wall as in the case of the brain, and if in addition to both of these there is a negative instead of a positive pressure within

¹Included under foreign bodies are dead bone, tendon and fascia, the walls of a tuberculous abscess cavity, as well as obvious foreign bodies, such as rubber tubing, gutta percha, drainage material, silk sutures



FIG. 6 Before a dressing is applied a sterile towel is laid on the bedside table and on it instruments and sterile dressings. With a little practice one can change a dressing quickly and still avoid adding infection to that which is already present or contaminating one's hands with wound secretion.

the abscess cavity, as in the case of an empyema thoracis, the problem of obliteration of the cavity becomes a major problem in the treatment of the abscess.

Assuming that such an abscess has been carefully drained and completely sterilized there are three methods by which obliteration may be accomplished: first, by the outward expansion of its inner wall, second, by the inward collapse of its outer wall and, third, by filling the sterile abscess cavity with living tissue. The methods of choice for accomplishing obliteration of an abscess cavity in bone, brain, and pleura are well described in text books of surgery. The principles involved, however, should always be kept in mind for methods of treatment of osteomyelitis of brain abscess of empyema and lung abscess not founded on correct surgical principles are frequently devised, possibly gain a vogue for a time, and are eventually discarded too often after the sacrifice of time, money, and health on the part of many patients and a corresponding loss of repute for the art of surgery.

RESTORATION OF FUNCTION

The surgeon must constantly remind himself that the aim of treatment is not only wound healing but restoration of function of the affected part. Too many patients are discharged from the hospital as 'cured' or 'recovered' with motionless fingers, claw-like hands, stiffened joints, wasted and atrophied muscles, deforming and disabling scars—often because in the attempt to overcome the infection the question of eventual function

was ignored or forgotten. A few simple rules are of primary importance, and must suffice for this discussion.

- 1 During the period of enforced immobilization—the stage of acute infection—the part should be immobilized in the position of function. In other words, in that position in which function would be greatest if mobility were impaired or lost.

- 2 As soon as the stage of acute infection is passed gentle movement two or three times daily through as complete a range as can be accomplished without pain prevents the formation of crippling adhesions.

- 3 Paralyzed or weakened muscles must be protected by splints from continual overstretching by the action of more powerful antagonists.

- 4 When open wounds are healed, by soaking the affected part in warm water and washing it for fifteen or twenty minutes once or twice daily, with a soft wash cloth and soap suds one can provide both an increased blood supply and gentle massage quite as effectively as with considerably more elaborate and expensive methods of treatment.

- 5 Active movement, even though limited in extent, constitutes the most helpful form of physical therapy.

A final word should be added concerning the technique of dressing wounds. To change the dressings for a patient with an infected wound without adding bacteria from without and without contaminating one's fingers with bacteria from the patient's wound is an art that is too little known and appreciated. Its importance is emphasized by the proved fact that once they have entered the deeper layers of the skin and the recesses about the finger nails one cannot wash pyogenic organisms from one's hands except by repeated scrubbing made over a period of several days.

The use of sterile instruments in dressing patients with clean or infected wounds seems to us absolutely essential. It is possible to remove a soiled dressing, to cleanse the tissues about an infected wound, and to apply a clean dressing without adding infection to the wound or to one's fingers if sterile instruments are used. Gloves can and often should be worn but they should be used to protect the surgeon's fingers from infection from the wound and not with the idea that if gloves are worn the dressings can be handled with impunity.

It may well be remembered that after soiled dressings are removed and the area about the

wound is cleansed with soap solution, or with some fat solvent as benzine or ether, clean dressings can be applied most easily if sterile muslin or a sterile towel is opened on the bedside table, the dressing made up to the desired thickness and laid *en masse* on the part which is to be covered. If the part is a limb, the limb can be laid upon the sterile dressing and the dressing folded about it.

One often sees a single dressing laid on the neck, the scalp, or some other part of the body, while the surgeon turns for a second compress the first falls away, is hastily caught, pushed back into position while the second slides in another direction, and when the dressing is completed all the gauze compresses have been exposed to contamination, and bacteria from the patient's skin have probably been introduced into the wound. Thoughtfulness, care, and the development of a careful technique prevent such accidents and amply repay the surgeon by the lessened morbidity which is consistently associated with a careful and correct technique in the treatment of infected wounds.

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SURGERY OF THE HEAD AND NECK

EYE

Hubbard W B The Treatment of Caustic Burns of the Eye *Arch Ophth* 1932 18 263

Cowan and Sinclair found that blindness was more often the result of a chemical burn than of a detached retina yet the latter has received far more attention

Several factors such as the elapsed time before treatment and the amount type and strength of the caustic substance causing the burn influence the choice of treatment Cosgrove and Hubbard reported in 1928 that the proper treatment was to irrigate the eye with water rather than to attempt to neutralize the caustic The present investigation was made for the purpose of comparing the reaction of acid and alkali burns to irrigation with water with the reaction to irrigation with weak neutralizing solutions

The solutions used were 32 per cent sulphuric acid and 0 per cent sodium hydroxide The acid was allowed to act for thirty seconds and the alkali for ten seconds these factors having been determined by experimentation as being sufficient to cause complete blindness Eleven drops of caustic were used Following the instillations one eye was irrigated with water and the other was irrigated with a neutralizing solution of a 2 per cent sodium bicarbonate or a 2 per cent acetic acid

In over 80 per cent of burns caused by acids it was found that irrigation with water alone was much more effective than irrigation of the corresponding eye with weak sodium bicarbonate solution On the other hand following an alkali burn 75 per cent of the eyes treated by irrigation with a weak acid solution were definitely better than those irrigated with water alone

Further studies on other caustic substances are needed to determine the proper treatment of caustic burns Investigations should be extended to caustic burns of the skin and of the gastro intestinal tract inasmuch as the results of the present investigation would contra indicate the administration of a weak alkali following an acid burn

EDWARD S PLATT MD

Spackman F W Localization of Intra Orbital Foreign Bodies *Arch Ophth* 1932 18 204

The author sums up his article as follows

In regard to the localization of an intra orbital foreign body, the roentgenologist should always familiarize himself with the history examine the wound made by the entrance of the foreign body and obtain any other pertinent data bearing on the case Roentgenograms for identification are sometimes taken if there is a question of lodgment in some structure outside the orbit Special projections of the orbital apex and the optic canal are often useful The

usual study for localization is then made invariably supplemented by soft tissue projections if the foreign body is thought to be minute or of low specific gravity and cannot be located on the usual films We cannot too strongly stress the importance of perfect immobilization as very slight movements of the globe may completely invalidate the results If the results of localization are not perfectly satisfactory a check up study is made

The chart used to record the results of the geometric method of localization is examined and if any doubt exists geometric and mathematical measurements are made to ascertain whether the foreign body is within the model eye The parallax study is resorted to in nearly all cases in which the particle is in the vicinity of the posterior part of the sclera If doubt still remains and it is important to determine whether double perforation is present roentgenography after the injection of air into Tenon's capsule and autovisualization are attempted Reliance is not placed on any one study, but all must be considered together The report to the operating ophthalmologist includes a description and the results of all the studies made and the judgment of the roentgenologist in interpreting the data obtained

LESLIE L MCCOY MD

King E F The Epithelial Growths of the Conjunctiva and Cornea *Proc Roy Soc Med Lond* 1932 30 1273

There seems to be no essential difference in the pathology of epithelial growths of the conjunctiva and of the cornea These growths are usually seen at the limbus Of the benign tumors papillomas are the most common They have the appearance of small raspberries and are seen most frequently in the fornices and on the caruncle They have a tendency to recur after removal but rarely become malignant Epithelial plaques are more rare and appear on the conjunctiva or cornea as well defined areas of epithelial hyperplasia the cells being of the psittacine type with superficial keratinization

Epithelioma usually occurs at the limbus in individuals over forty years of age and is seen most commonly in men At first the growth resembles a limbic dermoid but later it ulcerates and bleeds readily on manipulation The sclera tends to become eroded rather than infiltrated Intra ocular extension usually occurs along the anterior perforating vessels or by way of the vortex veins provided Tenon's capsule has been involved Only a very few cases of generalized metastases have been reported

If the cornea is extensively involved or if the growth has penetrated the globe the treatment of epithelioma should be enucleation of the eye Radium offers an efficient and simple treatment in early cases and is particularly indicated in this con

dition, as diagnosis is usually made early and metastases occur late. The author advocates the application of unscreened radium to the growth for relatively short periods, and repetition of the treatment if necessary. The cases of two patients cured by radium are reported.

WILLIAM A. MAYN, JR, M D

EAR

Le Mée, J. M., Rodger, T. R., Ebbs, J. H., Adams, S., and Others: A Discussion on Otitis Media in Early Childhood (Under Five Years) *Proc Roy Soc Med*, Lond, 1937, 30: 1293

Le Mée and others state that the presence of pus in the auricular cavities in the infant has not the same value and significance as in the child, and cannot be treated with standard procedures. In the pathology of the infant, the otologist should not content himself with otoscopy and x-ray findings, he should use his own experience in interpreting the facts, and base his decision whether to operate or not on his general impression of the case, in collaboration with the pediatrician, rather than on strictly local signs.

JAMES C. BRASWELL, M D

NOSE AND SINUSES

Coates, G. M.: Cholesteatoma of the Frontal Sinus. *Arch Otolaryngol*, 1937, 26: 29

The author reports in detail a case of cholesteatoma of the frontal sinus and states that, while some authors have attempted to identify rhinitis caseosa with cholesteatoma and while the symptoms often appear to be similar, the latter condition has certain characteristics which are thought to be diagnostic and are not found in the former. These characteristics are the basement membrane, or matrix, of squamous epithelium, the concentric arrangement of the desquamated cells, and the presence of platelets of cholesterol between the layers. These findings are in contrast to the cylindrical epithelial cells seen beneath the cheese-like masses of rhinitis caseosa and the amorphous character of the mass itself.

JAMES C. BRASWELL, M D

Cairns, H.: Injuries of the Frontal and Ethmoidal Sinuses, with Special Reference to Cerebrospinal Rhinorrhea and Aeroceles. *J Laryngol & Otol*, 1937, 52: 589

The author states that he has tried to show by illustrative cases the various ways in which cerebrospinal rhinorrhea and intracranial infection may occur after fractures of the frontal and ethmoidal sinuses. These injuries are produced by violent impacts on the forehead or face. In some cases, and particularly in aeroplane accidents, the upper and lower jaws are also fractured, and there is dissolution of the bony connections of the facial bones to the base of the skull.

It is sufficiently clear that in fractures of the frontal sinus and cribriform plate there is serious risk of

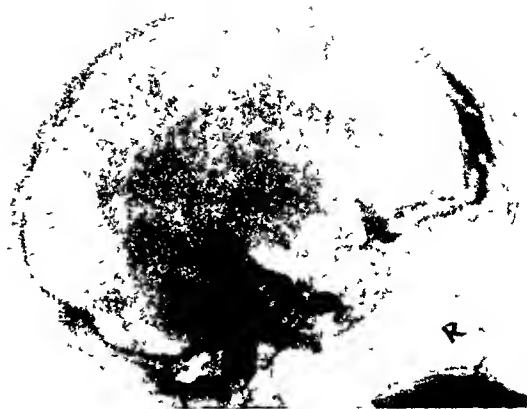


Fig 1. Fracture of frontal sinus and right frontal aerocele. Lateral skiagram showing sulci projecting into aerocele

intracranial infection, not only immediately after the accident but also at a later period, when any new catarrhal infection of the nasal passages may break through barriers weakened by previous injury. Infection usually takes the form of leptomeningitis, but sometimes it may spread through the substance of the brain and produce abscess of the frontal lobe or purulent ependymitis.

No statistics are as yet available as to the degree of risk in these cases, but the evidence collected in this article suggests that the time has come for more active measures to repair the injured dura by means of transfrontal operation and sutures, or fascial grafts. It has been shown that the dural defect is usually to be found in the neighborhood of the crib-

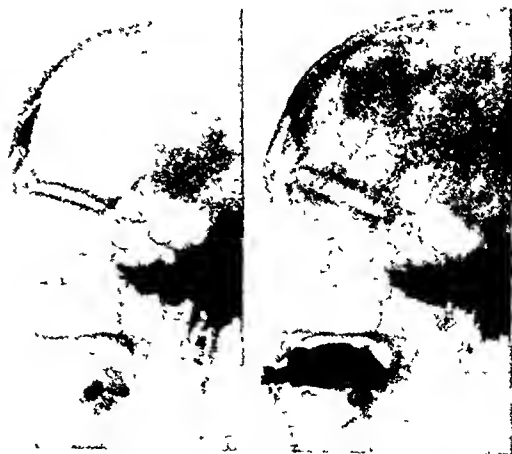


Fig 2. Fracture of frontal sinus and right frontal aerocele. (Left) Lateral skiagram in face-up position. (Right) Skiagram taken six days after operation.

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Epithelioma usually occurs at the limbus in individuals over forty years of age and is seen most commonly in men At first the growth resembles a limbic dermoid but later it ulcerates and bleeds readily on manipulation The sclera tends to become eroded rather than infiltrated Intra-ocular extension usually occurs along the anterior perforating vessel or by way of the vortex veins provided Tenon's capsule has been involved Only a very few cases of generalized metastases have been reported

If the cornea is extensively involved or if the growth has penetrated the globe the treatment of epithelioma should be enucleation of the eye Radium offers an efficient and simple treatment in early cases and is particularly indicated in this con

appears earlier, and is more severe. Examination with a laryngeal mirror generally gives valuable information. The growing goiter may press on the esophagus. In the presence of malignant tumors dysphagia is a common symptom. Of decisive significance is the correct evaluation of the form, consistency, and adhesions. Pronounced cachexia is rarely present in patients with malignant thyroids, since the patients die of severe changes in the cervical tissues and metastases long before the cachexia develops.

The laboratory studies done for the sake of differential diagnosis are helpful, though not of decisive significance. Roentgen examination is rarely of any value in deciding whether the thyroid enlargement is benign or malignant. Tissue puncture and tissue excision are of definite diagnostic value. There are numerous cases in which the examination methods are superfluous, since there are definite signs of malignancy, such as metastasis.

As concerns metastasis formation the views are divided. The view that even benign thyroid tumors may metastasize is opposed by the well known belief that metastatic processes are malignant. However, a condition which is clinically malignant may be benign histologically. The bones are a favorite site for the metastasis of thyroid tumors. A characteristic of metastasis of benign tumors is the fact that it generally occurs in long-standing tumors, of from ten to fifteen years' duration.

The differential diagnosis is made more confusing by the fact that thyroid tissues may be found in out of the way places, as aberrant thyroid glands. In such cases it is possible to decide whether the tissue is a recurrent malignancy or an aberrant thyroid only after considerable postoperative observation. These misplaced thyroid structures result either by pinching off from the main body of the thyroid or else from scattered germ rests. The postoperative enlargement with marked adhesions first calls attention to the possibility of malignancy.

There are true and pseudorecurrences, a special and rare form of the latter is the "vicarious" type. The author reiterates that for final diagnosis only a tissue examination is conclusive, but it is always necessary to remove as large a piece as possible from those portions which are most suspected of harboring malignancy. (E. ILLÉS) JACOB E. KLEIN, M.D.

McQuillan, A. S., and Breidenbach, L.. Morbidity Following Goiter Operations. *Ann Surg*, 1937, 106: 169.

This report covers 803 goiter operations performed in a fourteen-year period. All follow-up studies were done personally. In the absence of other abnormal findings, a basal metabolic rate from plus 15 to minus 15 was accepted as normal.

Two cases of acute fulminating thyrotoxicosis occurred pre-operatively, both patients died before operation.

Postoperative thyrotoxicosis occurs often about twenty-four to thirty-six hours postoperatively. It

occurred in 27 cases of primary hyperthyroidism and 3 cases of true adenoma. It was fatal in 8 cases.

Recurrences are found most frequently in the first two-year postoperative period. There were 54 recurrences (5.6 per cent), of these, 33 (3.4 per cent) followed primary operations. Four per cent of the Graves' goiters but only 2.6 per cent of the nodular goiters recurred. The recurrences appeared between six months and ten years. Some patients have temporary recurrences which disappear after elimination of the cause.

Twenty-one patients had persistent signs and symptoms (asthenia and rapid heart rate). Seven of them had received inadequate treatment, 1 had diabetes, and 15 had had the goiter a long time pre-operatively.

Persistent exophthalmos occurred in 42 cases (10.5 per cent). Thirty-eight cases were bilateral; 4 were unilateral. Three cases became intensified after operation.

Cardiac involvement occurred in 43 instances. Auricular fibrillation was the most frequent complication. Eighteen cases were decompensated. Eventually 20 showed improvement in the heart condition, 13 cleared up completely, and 10 showed no improvement or became worse.

Parathyroid tetany occurred in 2 cases, 1 after Graves' operation and 1 after carcinoma, recovery was complete.

There was 1 case of true postoperative myxedema; 8 cases of hypothyroidism required temporary thyroid feeding.

Pneumonia and tracheitis occurred 9 times with 5 deaths.

Embolism occurred in 6 cases, 2 patients with cerebral, and 3 with pulmonary, embolism died, and 1 with embolism of the right brachial artery recovered.

Five cases of deformities and partial collapse of the trachea occurred, but there was no total collapse. If in severe injury of the trachea no intubation anesthesia can be used, local anesthesia is indicated. Occasionally a goiter, usually cystic, needs to be decompressed.

There were 18 instances of disturbed phonation (1.8 per cent) due to injury of the recurrent laryngeal nerve, 5 were in the Graves and 13 were in the nodular group. Four of the 18 injuries occurred during the course of operation, while 14 occurred post-operatively. In all but 2 cases there was restoration of function.

Three hemorrhages occurred during operation, and there were 5 instances of secondary hemorrhage. Drainage was done in every case. Twelve infections occurred, the worst following the use of silk sutures, good catgut seems preferable to silk. Eight scars were unsatisfactory.

The incidence of psychosis was 0.7 per cent.

In 1 mild diabetic patient there was a disturbance following ligation of the upper pole, hence the carbohydrate metabolism should be investigated in all cases.

FRED S. MODERN, M.D.

reform plate and that access to this region by operation is not a difficult matter.

The indications for urgent surgical intervention are clear in cases of injury to the dura during intranasal operation on the ethmoidal and sphenoidal sinuses and in cases of delayed cerebrospinal rhinorrhea and aerocele following head trauma. In the acute stage of frontal and ethmoidal injuries the indication for immediate operation has not yet been clearly established. Greater accuracy of diagnosis of the side and site of injury to the cranial base is necessary before immediate operation with its attendant risk of aggravating shock already present can be justified. The cases reported here show that much can be done along these lines by more thorough radiography of the anterior cranial fossa. Congenital deficiencies in the cribriform plate may contribute to the production of cerebrospinal rhinorrhea both spontaneous and traumatic and these also can be disclosed with the x rays.

It is clear that in the past injuries of the frontal and ethmoidal sinuses have not received the attention they deserve. There is need for more precise and statistical knowledge of the ultimate fate of patients treated for these injuries and for close collaboration in this field between those who work below and those who work above the cribriform plate.

JAMES C. BRASWELL, M.D.

NECK

Beil J. H. Ludwig's Angina. *Internat. J. Orthodontia & Oral Surg.* 1937 3: 941

In his graduation thesis from the School of Dentistry, University of Pennsylvania, the author discusses Ludwig's angina from the standpoint of history, etiology, clinical pathology, symptomatology, diagnosis, prognosis, and treatment and reports a fatal case in which a tracheotomy was performed as a last resort.

From a study of the literature it is concluded that local infection of the mouth or trauma is frequently the primary cause of Ludwig's angina. The submaxillary infection invades the mouth and pharynx by way of the opening in the muscular buccopharyngeal wall through which the submaxillary salivary gland projects into the floor of the mouth. The cellulitis spreads from the tissues around the salivary glands to the opposite side of the throat and to the neck, and abscess formation is common. Streptococci are present always and staphylococci are sometimes found. Dysphagia and dyspnea are the first symptoms.

Early intra-oral drainage may bring the infection to a speedy termination. Either intra-oral or external incision will relieve pressure from edema. If pharyngeal abscesses are most safely approached by external incision. Tracheotomy is indicated if respirations become too difficult and labored. The prognosis varies with the virulence of the infection and depends largely upon early diagnosis and treatment.

WALTER H. NADLER, M.D.

Murphy W. B., and Ahnquist G. The Origin of Fetal Adenoma in the Thyroid Gland. *Arch. Surg.* 1937 35: 211

Beck in 1849 was the first to contend that fetal adenoma is of embryonic origin. Since then the discussion *pro* and *con* has been lively.

The fetal adenoma is an ovoid nodule about 4 cm. in diameter with a thin capsule. The capsule consists of strands of connective tissue and for a short distance such strands project into the nodule.

The follicles are most numerous in the periphery, are uniformly large and contain little colloid. The cells are high and cuboidal with large basophilic nuclei. Histologically they appear active. Budlike structures which consist of follicles in chainlike arrangement can be observed toward the inside of the nodule. The centers are occupied by colloid. The nodule is well vascularized.

The authors believe that these adenomas are the projections or buddings of active thyroid tissue into colloidal bodies.

Three stages of their development can be observed: (1) the formation of an unaltered colloid nodule; (2) the projection of hyperplastic epithelium into the colloid body; and (3) complete replacement of the colloid by hyperplastic epithelial cells arranged in a typical fetal pattern. The colloid acts as a supporting structure and is gradually replaced by epithelial elements. As it disappears hemorrhage may occur in the now unsupported vessel, with subsequent further alteration and secondary changes such as necrosis, cyst formation, hyalinization and calcification. The authors observed no malignant changes; such changes are conceivable although the newly formed epithelium may become normally functioning thyroid tissue.

FRED S. MODERN, M.D.

Pap L. Symptoms Indicative of Malignancy in Benign Goiters. (Bor. ártigkeit vortauschende Symptome bei gutartigen Kropfen). *Orvosi Hetil.* 1937 p. 479

Benign goiters are frequently accompanied by symptoms which lead one to suspect malignancy and render differential diagnosis particularly difficult. Rapid increase in size is usually indicative of malignancy, although recently in the material of the Hutt Clinic in Debrecen, Hungary, cases have been observed in which benign goiters enlarged most rapidly and gave the impression of being malignant. At certain stages of sexual development in women a rapid increase in size may be noted.

The author's observations confirm the intimate relation between the ovaries and the thyroid gland. A rapid growth is often caused by a hemorrhage into the struma. Trauma is an important cause of the hemorrhage, but it may also appear spontaneously. Often subacute and chronic thyroid inflammations simulate malignancy. The rapidly developing goiter most often gives the semblance of malignancy. After a certain period the goiter causes pressure symptoms. In malignant thyroids dyspnea is more frequent.

Other causes of postoperative delirium are the prolonged use of drugs in elderly people and low renal function. A true thyroid crisis after thyroidectomy is extremely rare. In these instances the delirium must be treated with large quantities of saline solution, dextrose solution, blood transfusions, and the continued use of iodine.

Disorientation following thyroidectomy may be caused by acute hypothyroidism. While it is usually an infrequent and transient condition appearing on the second or third day following thyroidectomy, it is interesting in its characteristics. Usually there is drowsiness and a peculiar glistening of the skin, together with nervousness, and there may be numbness and tingling of the extremities, without evidence of tetany. Usually nervousness and the mental confusion are mild, but disorientation may develop. These patients improve quickly with one large dose, from 6 to 10 grains, of thyroid. This must be followed by small doses of thyroid daily for a few days.

As an important factor contributing to morbidity in thyroid surgery, Dinsmore calls special attention to the technique of thyroidectomy, and emphasizes the fact that a definite morbidity rate may be directly attributable to the operation itself. He explains in considerable detail the principles he employs in thyroidectomy, i.e., the protection of the recurrent laryngeal nerves, the protection of the tracheoesophageal groove, and the protection of the parathyroid bodies. He stresses the point that the most difficult technical problem is to know how much thyroid tissue to remove in order to have a perfectly normal individual afterward, without objective or physical signs of either hypothyroidism or residual hyperthyroidism.

Other factors which may be the direct cause of morbidity are postoperative complications, such as

hemorrhage and pulmonary complications and, rather rarely, the development of acute tetany.

Even with meticulous care hemorrhage may follow thyroidectomy. If the hematoma forms rapidly, symptoms of suffocation may appear and the pressure must be relieved at once. Another type of hemorrhage practically always occurs in an intrathoracic goiter. It is the so-called mediastinal extravasation. Occasionally stridor appears after thyroidectomy. This may be caused by injury to a recurrent laryngeal nerve, or by edema of the larynx or glottis. If the stridor does not disappear quickly, or if there are signs of cyanosis, a tracheotomy should be performed without delay.

Dinsmore emphasizes the great usefulness of oxygen therapy in the postoperative management of elderly, severely ill patients with hyperthyroidism who are bad risks. These patients, if placed in the oxygen tent immediately after the operation and kept there for from twenty-four to forty-eight hours, usually show a lowering of temperatures, a quick clearing up of cyanosis, should it be present, easier respirations, and a diminution of postoperative mucus.

The development of acute tetany postoperatively is a terrifying experience to both patient and surgeon. Treatment depends entirely upon the administration of calcium in a quickly available form. Fortunately, this complication is rare.

The incidence of recurrent hyperthyroidism is usually somewhere between 2 and 3 per cent, while the incidence of hypothyroidism is far greater. In order to obtain a result in which neither of these clinical syndromes is present, Dinsmore suggests removing a little less tissue in the purely hyperplastic glands when performing a thyroidectomy.

MATHIAS J. SEIFERT, M.D.

Dinsmore R S Factors Influencing Morbidity in Thyroid Surgery *J Am M Ass* 1937 109 179

According to the author, pre operative and post operative care and mortality are given more attention by surgeons than morbidity. Thyroidectomy should return the patient to normal life. Dinsmore stresses the factors influencing morbidity in thyroid surgery as (1) exophthalmos (2) cardiac manifestations and (3) mental manifestations of which he gives a detailed report. A few important points follow.

The degree of exophthalmos is in no way indicative of the severity of the case. Generally, the patient's eyes return to normal if the operation is done early. If however the condition is of long standing and the eyes have reached a fixed position it is more than likely that prominence of the eyes will continue. Widening of the palpebral fissures in patients without exophthalmos promptly disappears following thyroidectomy. Emergency thyroidectomy is justifiable to save a patient's eyes in rapidly progressing exophthalmos. Sometimes it becomes necessary to close the eyelids in order to retain the eyes in their sockets. Fortunately this type of hyperthyroidism is rare.

A distressing exophthalmos sometimes develops postoperatively in a small number of patients with little or no exophthalmos pre operatively. This condition may be checked immediately if the patients are seen early enough and thyroid extract is given in liberal doses. So called unilateral exophthalmos is extremely rare. Upon closer examination a difference in the degree of exophthalmos, rather than a true unilateral condition is found.

Cardiac manifestations associated with the morbidity of hyperthyroidism are influenced by the age of the patient, the presence of organic heart disease, the duration of the disease and any associated hypertension and arteriosclerosis. Postoperative auricular fibrillation requires particular care. If after ten days following the operation there is no return to normal rhythm digitalis should be discontinued and quinidine given. This course is not advisable if there is a marked enlargement of the heart or if there is a history of long standing fibrillation, i.e. for one or two years with accompanying mitral stenosis. Sometimes the patient is hypersensitive to quinidine. This drug is never given pre-operatively. With its use approximately 95 per cent of the patients with paroxysmal fibrillation as well as those with continuous fibrillation return to normal rhythm. Elderly patients with auricular fibrillation present a considerable problem. Frequently this condition marks the onset of a long series of postoperative complications. Fortunately myocardial failure does not usually develop but there may be edema of the lungs. This may be superimposed on a chronic bronchitis. bronchopneumonia may develop and a definite mortality rate invariably follows.

When there is the slightest indication of congestive heart failure or auricular fibrillation in patients with hyperthyroidism before the operation the pre

operative use of digitalis becomes a valuable aid. No bad results are noted and the chances of auricular fibrillation appearing postoperatively are considerably lessened. Chronic auricular fibrillation may persist despite large doses of digitalis and it may be necessary to operate even though fibrillation is present. With rest in bed these cases show a gradual decline in the pulse curve and the danger is considerably lessened.

Among the mental manifestations sometimes met with in hyperthyroidism Dinsmore stresses (1) the psychosis of hyperthyroidism (2) the toxic delirium of the acute crises and (3) the delirium and mental confusion that are sometimes seen postoperatively. Occasionally a patient may have a true major psychosis and hyperthyroidism. There are some isolated reports in the literature of a manic depressive attack, schizophrenia or psychasthenia having been cured by a thyroidectomy. There are exceptional Dinsmore is of the opinion that in nearly every instance these patients have a psychosis and hyperthyroidism and that the former is not a result of the latter. An extremely guarded prognosis is advisable. It is safe to assure physical improvement from thyroidectomy but no promise for improved mental symptoms should be ventured.

An unexpected development of a major psychosis sometimes appears after thyroidectomy. While this is a very rare occurrence it is of extreme importance should it develop. Dinsmore believes this complication probably occurs no more frequently after a thyroidectomy than after any other surgical procedure. More than likely a psychiatrist will elicit a history of personality changes and previous episodes of the same character.

The second type of mental manifestation is the toxic delirium of acute hyperthyroidism. Now that a compound solution of iodine is used in a routine manner this form of mental manifestation is rather uncommon whereas before the days of iodine it was a frequent occurrence in hyperthyroidism. Nevertheless it is sometimes found.

Delirium sometimes accompanies the height of the reaction in patients who have a marked tachycardia, high temperature, nausea and vomiting, diarrhea, marked restlessness and mental agitation. Fortunately the majority of these patients can be controlled with iodine therapy alone, especially if iodine has never been taken or has not been used recently. In these cases iodine is preferably given intravenously but it can also be quickly and easily absorbed when painted on the skin.

The third group of patients are those in whom delirium and mental confusion appear postoperatively. Liver failure appears to be the most common cause. This delirium usually occurs on the second or third day and is most apt to occur in persons beyond middle life. The icteric index rises and jaundice may be an accompanying symptom. These patients recover promptly following the administration of dextrose intravenously which replaces the diminished glycogen reserve of the liver.

panied by objective evidence of nerve involvement, such as anesthesia, reflex change, and wasting of muscle. There is evidence of progressive involvement of neighboring structures.

It is impossible to carry out alcohol injection safely in the treatment of glossopharyngeal neuralgia. Extracranial avulsion of the glossopharyngeal nerve may not result in permanent relief of the pain. Intracranial resection of the nerve offers the best chance of permanent cure.

The author calls attention to the transitory rise of the blood pressure which accompanies section of the glossopharyngeal nerve. This fact should be remembered in considering the operative risks in patients with hypertension who are suffering from glossopharyngeal neuralgia.

ROBERT ZOLLINGER, M D

SPINAL CORD AND ITS COVERINGS

Soltz, S E, and Jervis, G A. Extramedullary Tumors of the Upper Cervical Portion of the Spinal Cord. *Bull. Neurol Inst, New York*, 1937, 6: 274

This paper presents a thorough review of the physical signs and clinical symptoms of extramedullary tumors of the upper cervical cord alone, or those arising in the cerebellopontile angle and involving the upper cervical cord by extension through the foramen magnum. It is pointed out that motor involvement, resulting in varying degrees of weakness, atrophy, and fibrillation, is the most common phenomenon inasmuch as the tumors are most often found on the ventral or ventrolateral aspect of the cord where the pyramidal tracts and ventral horns are most readily affected. Sensory changes, when present, are, as in other cord lesions, of much value in determining the exact level of the lesion. The authors point out that alteration of the diaphragmatic movements is of much diagnostic importance. The lower cranial nerves may often become involved, as well as the cerebellum. Postural disturbances of the neck are frequently a part of the picture. Tenderness of the vertebrae over the lesion and the postural effect upon pain are almost constant signs. Even increased intracranial pressure may be produced with a confusion of the clinical picture. Vesical disturbances are rare, a block may or may not be present, and the protein content of the cerebrospinal fluid is of small diagnostic value. These high-lying cervical tumors are not infrequently confused with amyotrophic lateral sclerosis, dorsolateral sclerosis, multiple sclerosis, chronic adhesive arachnoiditis, aneurysms, varicosities, and even intracranial neoplasms, and they very often present a difficult problem of differential diagnosis.

The usual histological types of tumors are found in the extramedullary high cervical-cord neoplasms. They are teratomas, chordomas, meningiomas, chondromas, sarcomas, perineural fibroblastomas, endotheliomas, neurofibromas, osteofibromas, and melanosarcomas.

JOHN MARTIN, M D

Ranzi, E, and Sgalitzer, G, Jr.: The Results of Operations for Spinal-Cord Tumors (Ueber die Ergebnisse unserer operationen wegen Rueckenmarkstumor) *Wiener klin Wchnschr*, 1937, 1: 777

The authors report on operations for spinal-cord tumors at the First Surgical Clinic of Vienna for the period from 1927 to 1937 and at the Innsbruck Surgical Clinic from 1924 to 1932, a total of 45 cases. From Eiselsberg Clinic 112 such cases were published so that the entire number reported was 157. According to the site of the tumors, they may be classified as follows. (1) extradural, (2) intradural extramedullary, and (3) intramedullary. In addition there were 4 other cases operated upon for spinal-cord tumor, but no tumor was found. Extradural tumors may originate in the spinal column, or they may lie in the vertebral canal without any relation to the vertebral column. Extradural tumors may be classed as metastatic or primary, the former offer no indication for surgical treatment. Among the primary tumors, the most important is the sarcoma. Naturally the prognosis in such cases is unfavorable. Of 7 patients with extradural tumors, 6 from the vertebral column and 1 extradural hemangioma, 2 died after the completion of the operation, 1 was permanently cured after ten years, the condition in 1 was improved, 3 were not cured, and 1 died.

The intradural extramedullary tumors make up the most important and most interesting group of the spinal-cord tumors. They arise from the spinal-cord membranes and from the efferent nerve roots. There were 22 such cases. They included 4 tumors in the cervical cord, 15 in the thoracic cord, and 3 in the lumbar cord. Twenty-one tumors were confirmed by operation, in 1 case the tumor could not be found at operation, although verified later at autopsy. For the most part they were benign tumors which were sharply demarcated, some were hard, some soft, from the size of a pea to that of a plum. They were endotheliomas, neurinomas, or ganglioneuromas, in 1 case there was a rare intradural angioma. In only 2 cases was a malignant tumor diagnosed histologically, although in these 2 cases the patients have remained well for one year and fifteen years, respectively. Not rarely there is a multiple incidence of these tumors of the spinal-cord membranes, thus in 1 case 4 tumors of the cauda, hanging on the roots and varying in size from that of a hazelnut to a bean, were extirpated. The occasional recurrence of benign tumors may be ascribed to this occasional occurrence of multiple tumors. Of the total number of 22 patients in this series 3 died, 2 patients, aged seventy-one and sixty-three years, died of cardiac insufficiency, and a forty-seven-year-old patient died of pulmonary inflammation. Ten patients were cured; the condition in 2 was improved, or mildly improved, 2 patients remained uncured, 1 of whom died, and 3 could not be followed up.

Two previously unpublished cases of intramedullary tumors are reported from the Innsbruck Clinic.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS, CRANIAL NERVES

Carpenter R C Chamberlin C W, and Frazier C H The Treatment of Hypophyseal Stalk Tumors by Evacuation and Irradiation *Am J Roentgenol* 1937 35 162

Of 8 patients with hypophyseal stalk tumor treated by surgery alone 5 underwent partial or subtotal removal of the tumor. One died at the time of the operation, 3 within three months and 1 within nine months and 3 within three years of the operation. Of 4 patients treated by aspiration and irradiation a procedure strongly advocated by the authors all were alive and well on the average of thirty and a half months after treatment was instituted. Irradiation greatly prolongs the intervals between the evacuation of the cyst and recurrence of the symptoms. In cases treated by evacuation alone the time interval between evacuation and recurrence of the symptoms varied from three weeks to six and a half months while in those which received irradiation after evacuation the interval varied from seventeen to thirty nine months.

Experience has shown that any attempt at radical removal of these tumors is attended with risk and may be fatal in its outcome. The risk of fatal outcome is greatly minimized by simple evacuation and irradiation. DAVID IMPASTATO M.D.

Anspach M K The End Results in Cases of Purulent Meningitis Observed at The Leipzig Children's Clinic in the Period from 1924 to 1934 (Das weitere Schicksal der in der Leipziger Kinderklinik in den Jahren 1924-1934 beobachteten Fälle von Meningitis purulenta) *Monatsschr f Kinderh* 1936 66 304

The author classifies the 32 cases discharged after suppurative meningitis into three groups (1) those with no abnormal findings on discharge (2) those with residual after effects with and without hydrocephalus and (3) those not cured. In the ten year period under consideration a total of 262 cases were treated.

The mortality from meningococcus meningitis was 64.3 per cent from pneumococcus and streptococcus meningitis and coliform meningitis it was 100 per cent. The follow up study of the discharged patients was made from two to eleven years later. Of the 6 not cured when discharged only 1 remained alive. Of the 15 discharged from the first group those with out any findings only 40 per cent were completely free from difficulties the others presented neuro pathic symptoms headaches nervous irritability and exhaustion. The same disturbances were observed in 6 children of the second group whereas the 5 patients with hydrocephalus showed little disturbance of their physical development although

mentally they were considerably retarded. Of these 3 had diminished vision and hearing up to the point of deafness, and 1 had ataxia.

(H HAENEL) JACOB E KLEIN M.D.

Adler Experiences in the Treatment of Trigeminal Neuralgia by the Kirschner Procedure (Erfahrungen ueber die Behandlung der Trigeminal neuralgie nach dem Kirschnerschen Verfahren) *Zentralbl f Chir* 1937 p 1362

For the past year electrocoagulation of the gasserian ganglion with the traction apparatus was done more than 25 times at the Sauerbruch Clinic for the treatment of trigeminal neuralgia according to the method of Kirschner. The ganglion was reached without any difficulty through the foramen ovale. By carrying out the coagulation without evipan anesthesia destruction of the fibers of the first branch could be avoided as well as threatening danger of the development of a neuropathic keratitis. The development of herpes zoster was observed in 2 patients and in 1 collapse occurred during the coagulation. In another patient a slowly enlarging ulcer on the ala nasi of the corresponding side appeared after treatment. This suggested a trophic ulceration. Recurrences following the coagulation were not observed. The patient whose history was reported by Zutt showed all the symptoms of an aseptic meningitis in connection with the collapse. Sauerbruch advanced the belief that this might have been a case of air embolism. (SEITZING) LOUIS NEUWELT M.D.

Cohen H Glossopharyngeal Neuralgia *J Laryngol & Otol* 1937 52 527

The syndrome of glossopharyngeal neuralgia is discussed and 4 cases are presented in detail.

The author classifies the cases as secondary neuralgia when there is a gross pathological lesion involving the nerve such as a tumor inflammatory exudate hemorrhage or neuritis. The main clinical characteristics of the cases include pain which is paroxysmal and occurs as stabbing shock like thrusts of short duration and is separated by intervals of complete freedom from pain. Stimulation of the 'trigger zones' will precipitate paroxysms of pain. There is no clinical evidence of loss of function of the nerve. The condition usually occurs in middle life though no age is immune. The pain recurs at intervals over a period of many years without spreading to the neighboring nerves.

Primary neuralgias include the cases in which there is an absence of any demonstrable pathology even when the patient is observed over a long period of time. The condition is characterized by the boring aching type of pain which is present consistently and subject to exacerbation. The pain is accom

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Pettinari, V.: A Contribution to the Knowledge of Lymphoblastoma of the Breast (Contributo alla conoscenza del linfoblastoma a sede mammaria) *Chin chir*, 1937, 13 507

Pettinari observed a lymphoblastoma of the breast in a thirty-year-old woman whose past history was essentially negative. While nursing the baby three months following her last labor, she observed that the nipple of the left breast began to enlarge considerably and that this was accompanied by pain. The baby was taken off the breast and local applications were made without any appreciable results. During the following five months the tumefaction progressed rapidly.

When seen at the clinic, the skin over the involved area was tense and angry red and the entire breast was fixed to the underlying tissues. The patient's general condition appeared rather poor. At the left side of the neck there was found a hard mass about the size of a walnut and with an irregular surface. There was no pain on pressure. In the axilla a few small, hard and smooth glands were palpated. The spleen was not enlarged and the white-cell count was 6,800, with no immature forms. The red blood count was 3,800,000.

In spite of local treatment at the hospital with trypaflavine the tumefaction progressed, and the pain was so severe that even morphine was of no avail.

In view of the patient's condition, the author decided to perform a radical mastectomy. The operation was performed under local anesthesia. The immediate postoperative condition was good, the patient was discharged, but two months later she died of an intercurrent bronchopneumonia. During her convalescent period at home, additional subcutaneous tumors up to the size of a small apple had made their appearance on the anterior surface of the abdomen. Unfortunately, no autopsy could be performed.

Histological examination revealed a completely altered breast tissue. With high magnification three types of cells could be seen. The predominating cells were typical lymphocytes containing basophilic granules in the cytoplasm. There were also found elements with a basophilic cytoplasm and a kidney-shaped nucleus, these were identified as lymphoblasts. There was finally a group of cells of the histiocytic type occurring in much smaller number.

The cellular elements were for the most part in good condition. Only a few cells were undergoing vacuolar degeneration, karyorrhexis or karyolysis. There were no polynuclears, giant cells, plasma cells, or eosinophils. Mitoses were relatively infrequent and were seen especially in the larger cells. The cellular elements were held together by a very

delicate reticular network. The vascularization of the tissue was poor.

According to the author, the interpretation of the case is not easy. The differential diagnosis includes round cell sarcoma, lymphogranuloma, lymphosarcoma and lymphadenosis.

After having ruled out the possibility of any of the aforementioned conditions, the author concludes that this case represents one of lymphoblastoma characterized mainly by the selective and rapid invasion of an organ, by its relationship to pregnancy and by its metastasis along the lymphatics and not by way of the blood stream as is the case in round-cell sarcoma, from which the present pathological condition is differentiated with great difficulty.

RICHARD E. SOMMA, M.D.

Coleman, M.: Scleroderma Simulating Carcinoma of the Breast. *Brit J Surg*, 1937, 25 61

The author describes 2 cases of a localized type of scleroderma affecting the skin of the breast. In both cases the condition resembled malignant disease so strongly that operation was performed. In 1 case, an exploratory incision was made and the affected area excised, in the other, a local biopsy was performed. The author considers these cases important not only because of the difficulty they presented in diagnosis, but also because of the viewpoint of the patient with respect to prognosis. The article is accompanied by illustrations showing the histological picture in each case, and the histological appearance of scleroderma is described briefly.

With regard to the diagnosis, the author states that circumscribed scleroderma is not accompanied by general symptoms or vasomotor phenomena and there are usually no associated subjective symptoms. The skin changes are localized and well defined, distinct nodules in the skin are never present, and no mass can be palpated in the breast. Female patients are most frequently affected between the ages of twenty-one and forty years.

EMIL C. ROBITSHEK, M.D.

Herzog, K.: The So-Called Colloid Cancer of the Breast (Ueber den sogenannten Schleimkrebs der Brustdruese). *Beitr z path Anal*, 1937, 99 163

The minute tissue changes occurring in 9 cases of colloid cancer of the breast are described in detail. Special mucus stains reveal that in mucoid carcinoma of the breast, the mucus is not derived from preformed tubular or glandular spaces, but that the epithelial cells grow first in solid rows and later smaller and larger cavities are formed by the secretion of colloid. The cells finally burst from the accumulation of mucus and are finally dissolved and disappear between the masses of colloid. Papillary proliferations may also develop. It is surprising that small-cell forms of carcinoma reveal small drops

In the first patient there was a transverse lesion from the fourth to the sixth dorsal vertebrae, whether it was intramedullary or extramedullary could not be decided. Upon removal it was found to be a glioma of the size of a cherry. Seven years after the operation there was still no improvement in the condition. The second case showed a transverse lesion below the thoracic vertebrae. Operation was negative except for the finding of a meningitis serosa cystica. Death occurred from pyelonephritis seven months after operation. Autopsy showed a diffuse central necrotic glioma which extended from the thoracic cord up into the cervical cord. With regard to examinations with the aid of lipiodol the authors note that true injury from iodine is very rare because resorption proceeds very slowly and consequently only minimal amounts are absorbed (BODE) JACOB E. KLEIN, M.D.

SYMPATHETIC NERVES

De Takats, G. The Effect of Sympathectomy on Peripheral Vascular Disease. *Surgery* 1937 1: 46

Sympathectomy has been performed by the author on selected cases of Raynaud's disease, Buerger's disease, poliomyelitis with vasospastic phenomena, reflex dystrophy of the extremities and a group of unclassified cases which exhibit Raynaud's phenomenon. A demonstrable capacity of the peripheral vascular bed for dilatation should be common to all the groups. Whether such pre-operative tests are made by the production of fever by causing reflex dilatation with heat with spinal anesthesia or with peripheral or paravertebral nerve block depends on the choice of the operator. In addition the author uses the sodium nitrite test, which, although it requires the use of an oscillogram, has two great advantages: it can be performed on ambulatory patients and it does not require the reading

of surface temperatures. The test consists of the determination of an oscillogram curve at the distal part of the extremity, which is followed by an intravenous injection of 1 c.c. of a 4 per cent solution of sodium nitrite. From ten to fifteen minutes following the injection the peak of the vasodilatation may be observed but the effect may last as long as one hour.

The following findings are the indications for sympathectomy in the various types of conditions.

In Raynaud's phenomena there should be a lack of marked structural changes in the vessels and absence of sclerodactylia.

In Buerger's disease there should be definite collateral reserve, absence of acute inflammation or arteriolar destruction and poor response to conservative treatment.

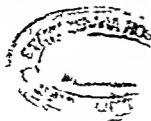
In poliomyelitis there should be moderate paralysis limited to one extremity and evidence of vasospastic phenomena and the age of the patient should be preferably between six and ten years.

In reflex dystrophy (causalgia, traumatic vessel spasm, Sudeck's atrophy) the severe cases should be resistant to physiotherapy and exhibit exaggerated vasomotor responses.

A very careful selection of cases is necessary for good postoperative results. In the author's series only 10 of 125 patients with Buerger's disease were treated by sympathectomy.

The operative procedures are well described and illustrated. On the lower extremity, the typical lumbar sympathectomy which removes the chain and intervening ganglia from the second to the fourth lumbar segment inclusive has been uniformly successful. On the upper extremity preganglionic sympathectomy by section of the thoracic sympathetic chain below the third thoracic ganglion and section of the second and third white rami gives the best results.

DAVID IMPASTATO, M.D.



SURGERY OF THE THORAX

CHEST WALL AND BREAST

Pettinari, V.: A Contribution to the Knowledge of Lymphoblastoma of the Breast (Contributo alla conoscenza del linfoblastoma a sede mammaria) *Clin chir*, 1937, 13 507.

Pettinari observed a lymphoblastoma of the breast in a thirty-year-old woman whose past history was essentially negative. While nursing the baby three months following her last labor, she observed that the nipple of the left breast began to enlarge considerably and that this was accompanied by pain. The baby was taken off the breast and local applications were made without any appreciable results. During the following five months the tumefaction progressed rapidly.

When seen at the clinic, the skin over the involved area was tense and angry red and the entire breast was fixed to the underlying tissues. The patient's general condition appeared rather poor. At the left side of the neck there was found a hard mass about the size of a walnut and with an irregular surface. There was no pain on pressure. In the axilla a few small, hard and smooth glands were palpated. The spleen was not enlarged and the white-cell count was 6,800, with no immature forms. The red blood count was 3,800,000.

In spite of local treatment at the hospital with trypaflavine the tumefaction progressed, and the pain was so severe that even morphine was of no avail.

In view of the patient's condition, the author decided to perform a radical mastectomy. The operation was performed under local anesthesia. The immediate postoperative condition was good, the patient was discharged, but two months later she died of an intercurrent bronchopneumonia. During her convalescent period at home, additional subcutaneous tumors up to the size of a small apple had made their appearance on the anterior surface of the abdomen. Unfortunately, no autopsy could be performed.

Histological examination revealed a completely altered breast tissue. With high magnification three types of cells could be seen. The predominating cells were typical lymphocytes containing basophilic granules in the cytoplasm. There were also found elements with a basophilic cytoplasm and a kidney-shaped nucleus, these were identified as lymphoblasts. There was finally a group of cells of the histiocytic type occurring in much smaller number.

The cellular elements were for the most part in good condition. Only a few cells were undergoing vacuolar degeneration, karyorrhexis or karyolysis. There were no polynuclears, giant cells, plasma cells, or eosinophils. Mitoses were relatively infrequent and were seen especially in the larger cells. The cellular elements were held together by a very

delicate reticular network. The vascularization of the tissue was poor.

According to the author, the interpretation of the case is not easy. The differential diagnosis includes round cell sarcoma, lymphogranuloma, lymphosarcoma and lymphadenosis.

After having ruled out the possibility of any of the aforementioned conditions, the author concludes that this case represents one of lymphoblastoma characterized mainly by the selective and rapid invasion of an organ, by its relationship to pregnancy and by its metastasis along the lymphatics and not by way of the blood stream as is the case in round-cell sarcoma, from which the present pathological condition is differentiated with great difficulty.

RICHARD E. SOMMA, M.D.

Coleman, M.: Scleroderma Simulating Carcinoma of the Breast. *Brit J Surg*, 1937, 25 61.

The author describes 2 cases of a localized type of scleroderma affecting the skin of the breast. In both cases the condition resembled malignant disease so strongly that operation was performed. In 1 case, an exploratory incision was made and the affected area excised, in the other, a local biopsy was performed. The author considers these cases important not only because of the difficulty they presented in diagnosis, but also because of the viewpoint of the patient with respect to prognosis. The article is accompanied by illustrations showing the histological picture in each case, and the histological appearance of scleroderma is described briefly.

With regard to the diagnosis, the author states that circumscribed scleroderma is not accompanied by general symptoms or vasomotor phenomena and there are usually no associated subjective symptoms. The skin changes are localized and well defined, distinct nodules in the skin are never present, and no mass can be palpated in the breast. Female patients are most frequently affected between the ages of twenty-one and forty years.

EMIL C. ROBITSHER, M.D.

Herzog, K.: The So-Called Colloid Cancer of the Breast (Ueber den sogenannten Schleimkrebs der Brustdruese) *Beitr z. path Anat*, 1937, 99 163.

The minute tissue changes occurring in 9 cases of colloid cancer of the breast are described in detail. Special mucus stains reveal that in mucoid carcinoma of the breast, the mucus is not derived from preformed tubular or glandular spaces, but that the epithelial cells grow first in solid rows and later smaller and larger cavities are formed by the secretion of colloid. The cells finally burst from the accumulation of mucus and are finally dissolved and disappear between the masses of colloid. Papillary proliferations may also develop. It is surprising that small-cell forms of carcinoma reveal small drops

of mucus secretion, and not the large cavity formation seen in large cell carcinomas. There are great similarities between the chondromas and colloid carcinomas but the inner relationships still await explanation.

The literature pertaining to this subject is extensively reviewed. In all of the cases relationships with chronic cystic mastopathia were also found. Most colloid carcinomas of the breast belong to a relatively benign and slow growing type. Only rarely are they very malignant, growing rapidly from the start. (JUNGHANS) LEO M. ZIMMERMAN M.D.

TRACHEA, LUNGS, AND PLEURA

Cleveland M. Lateral Curvature of the Spine Following Thoracoplasty in Children. *J Thoracic Surg*, 1937 6 595

This article is based on material from the Orthopedic Service of the Sea View and St. Luke's Hospitals, New York, and presents a study of 6 tuberculous children who had previously been subjected to a thoracoplasty. In each case the progress of the curvature of the spine was well illustrated by a series of roentgenograms and was progressive up to about twenty-four months. In 5 patients the average curve a year after operation was between 25 and 30 degrees. One child twelve years of age progressed during a two-year period to a deformity of 74 degrees. For purposes of comparison the case of a typical adult patient was cited to show a curvature of from 12 to 13 degrees.

In regard to prevention and treatment the author refers to the inadequacy of braces, casts and other appliances. He believes that the best results will probably be achieved by spinal fixation in multiple stages or as brought out in the subsequent discussion by turning the ribs on the operated side so as to form a splint that corrects and prevents the later contraction. G. DANIEL DELFRAT M.D.

Moore R. L. The Surgical Treatment of Pulmonary Abscess. *Ann Surg* 1937 106 183

Moore reports the results of treatment of 34 cases of pulmonary abscess and states that these results might be improved if the internist were more conversant with the results of early surgical drainage.

An analysis of these 34 cases of surgically treated pulmonary abscess showed that 28 (82 per cent) had existed for more than two months and 22 (65 per cent) for more than three months before the first operation was performed. The initial surgical treatment in all of these cases was rib resection and drainage in one or more stages. Six patients died in the immediate postoperative period. Of the 28 that survived the simple drainage operations only 9 presented spontaneous healing and experienced relief from symptoms. The remaining 19 patients had to be subjected to other more complicated and hazardous procedures such as cauterized pneumectomy and lobectomy. Simple drainage was not sufficient to effect a cure in these patients because of

extensive fibrosis and bronchiectasis due to the prolonged period of medical care.

In a discussion of the operative technique the author stresses the necessity for complete adherence of the lung to the chest wall before drainage is attempted. After drainage has been established preferably in from six to eight weeks after the onset of the disease the wound is given time to heal. Cauterized pneumonectomy may be necessary to insure adequate drainage. Persistent cavities or fistulas are treated by excision and closure of the wound or lobectomy. Lobectomy is indicated when extensive fibrosis makes closure of a residual cavity or fistula impossible.

The author states that lobectomy in cases which have had a satisfactory period of drainage is followed by far fewer postoperative difficulties than in cases of bronchiectasis.

The complications of surgical drainage include pneumonia which is by far the most frequent, hemorrhage, empyema, cellulitis of the chest wall and air embolism. Less serious complications are osteomyelitis of a rib or the sternum, infection of a costal cartilage and persistent sinuses due to residual cavities in the pleura at the site of operation.

The aforementioned methods of treatment are believed to be necessary in from 30 to 80 per cent of the cases of pulmonary abscesses, i.e. those which do not drain spontaneously by way of a bronchus.

THOMAS C. DORRANCE M.D.

Bisgard J. D. Skeletal Deformities in Children Resulting from Empyema and Methods of Prevention. *J Thoracic Surg* 1937, 6 609

During the course of thoracic empyema temporary scoliosis is not infrequent but if the disease is treated promptly and adequately the scoliosis soon disappears. In prolonged cases, however, or in those which have been improperly treated, precaution must be taken lest the deformity become permanent. Scoliosis due to empyema differs from other types in that there is no rotation of the bodies of the vertebrae, probably because of the fixation of the ribs. In order to prevent skeletal deformity the empyema cavity should be given an opportunity to close by early adequate and dependent drainage. In addition a constant effort should be made to hold the spine in alignment or in slight overcorrection during the major portion of each twenty-four hours, both during treatment and for several months thereafter while contracture of scar tissue is taking place. Postural treatment may be accomplished with pillows to support the upper end of the spine and allowing the central portion to sag or with a pillow in the central portion exerting a jack-knife effect. The convexity of the curve is toward the unaffected lung. These positions may also be maintained by the application of partial plaster casts.

The author prefers the vertical incision for rib resection for drainage of the empyema and crushes the next intercostal nerve above and below. This gives a much less painful wound which permits the

pressure of the supporting pillow or cast with less discomfort

In patients who have had an operation for the removal of several ribs, as in a thoracoplasty, the resultant scoliosis differs from the type described as it is rotary and resembles the congenital type, and in these patients the convexity of the spinal curve is toward the side which has been operated upon. In general, the same treatment may be utilized for preventing postoperative scoliosis, but the results are less satisfactory. G DANIEL DELPRAT, M D

HEART AND PERICARDIUM

Schmieden, V., and Westermann, H. H.: The Operative Management of Fibrous Pericarditis. *Surgery*, 1937, 2 350

The authors' operative management of fibrous constricting pericarditis begins with a very intensive pre-operative medical management. The burden on the heart is lightened by relieving the marked hydrops. This is accomplished with a salt-free diet and diuretics. If necessary, fluid is aspirated from the pleural and peritoneal cavity. Strophanthin is given if it is needed to strengthen and regulate the heart beat.

Local anesthesia is used when possible, but a positive-pressure anesthesia apparatus should be available. A pleural tear is most apt to occur at the anterior margin of the left pleural fold, and this can be sutured under forced respiration if necessary.

The authors' operative technique is based on the following principles: (1) liberation of the left ventricle first, in order that it can receive and immediately deliver to the systemic circulation the increased output of the right ventricle, following its subsequent decortication, and thus avoid the right-sided venous congestion that would otherwise occur, (2) freeing of the right ventricle, which then usually dilates more efficaciously and beats stronger, and (3) avoidance of the freeing of auricles because of their thin walls.

The authors resect from the third to the fifth costal cartilages, the adjacent portions of the ribs, and a large portion of the sternum. Because of the phrenic nerve the transpleural approach is not used, but rather the pericardium is approached between the two pleural layers. After the proper line of cleavage is found, the pericardium is peeled out as an orange is peeled, not like an apple. After removal of the coarse mantle, the separated strips are torn off until the myocardium is everywhere visible. The free-lying border of the anterior pleural fold is attached to the left margin of the thoracic window. The pectoralis major muscle is excised in order to prevent undesirable adhesions. The skin flap and subcutaneous fat are sutured back in place. Two or three small drains are placed in the wound.

The authors report 22 cases. Six (27.3 per cent) of the patients regained complete ability to work after

healing; another 6 showed marked improvement and prolongation of life after long observation; 1 (4.5 per cent) died on the operating table of acute dilatation of the right ventricle, 7 (31.9 per cent) died during the postoperative period; and 2 (9 per cent) died after transitory improvement in their condition.

EARL O LATIMER, M D

ESOPHAGUS AND MEDIASTINUM

Fischer, A. W.: Removal of the Thoracic Portion of the Esophagus by the Abdominocollar Route (Die abdominokollare Entfernung des Brustteiles der Speiserochre). *61 Tag d deutsch Ges f Chir*, Berlin, 1937

Surprisingly little has been done in the last few years on the problem of the surgical treatment of cancer of the middle thoracic segment of the esophagus, considering the intensive work that was devoted to this field previously. Had important advances been made in the treatment by roentgen rays and radium, the surgeon would be justified in laying down the knife. However, such has not been the case. Surgeons should therefore not allow themselves to become discouraged by earlier failures, but should attack the problem anew.

In a critical comparison of the various procedures, the author gives the preference to the abdominocollar method without opening of the pleura or suturing of the esophagus, because with this method there is least danger of mediastinitis and least shock. He reports two operations. The first had an unfortunate termination, the operation was plainly too extensive, the removal of the esophagus being followed immediately by a plastic repair with freeing of the stomach and its elevation into the wound in the neck. In the second case, that of a sixty-six-year-old woman, he therefore contented himself with removal of the esophagus together with the carcinoma at the level of the bifurcation after blunt mobilization carried out through the openings in the abdomen and neck. The final result was a gastric fistula and a salivary fistula in the neck. The patient bore the operation well in spite of her poor general condition, at present, six months after operation, she is in good condition. Thus this method of removing a cancer of the middle thoracic segment of the esophagus, first successfully used by Turner, has another case to its credit. What was possible in this elderly, obese woman, would be still more likely to be obtained in younger individuals in better general condition.

In the discussion Denk stated that he had, in 1913, worked out the method of operation used by Fischer and had published it in the *Zentralbl f Chir* in the same year. This method is suitable only for early cases of carcinoma. If there are adhesions to neighboring structures, the carcinoma will rupture during the attempt to free it and a fatal mediastinitis inevitably will result, as was shown in 4 of his own cases.

FLORENCE A CARPENTER

of mucus secretion, and not the large cavity formation seen in large-cell carcinomas. There are great similarities between the cylindromas and colloid carcinomas but the inner relationships still await explanation.

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The aforementioned methods of treatment are believed to be necessary in from 50 to 80 per cent of the cases of pulmonary abscesses in which the abscess does not drain spontaneously by way of a bronchus.

THOMAS C. DOWGLASS M.D.

Bisgard J. D. Skeletal Deformities in Children Resulting from Empyema and Methods of Prevention. *J Thoracic Surg* 1937, 6: 609

During the course of thoracic empyema temporary scoliosis is not infrequent but if the disease is treated promptly and adequately the scoliosis soon disappears. In prolonged cases, however, or in those which have been improperly treated, permanent scoliosis must be taken lest the deformity become permanent. Scoliosis due to empyema differs from other types in that there is no rotation of the bodies of the vertebrae, probably because of the fixation of the ribs. In order to prevent skeletal deformity the empyema cavity should be given an opportunity to close by early adequate and dependent drainage. In addition a constant effort should be made to hold the spine in alignment or in slight overcorrection during the major portion of each twenty-four hours both during treatment and for several months thereafter while contraction of scar tissue is taking place. Postural treatment may be accomplished with pillows to support the upper end of the spine and allowing the central portion to sag, or with a pillow in the central portion exerting a jack-knife effect. The convexity of the curve is toward the unaffected lung. These positions may also be maintained by the application of partial plaster casts.

The author prefers the vertical incision for rib resection for drainage of the empyema and crushes the next intercostal nerve above and below. This gives a much less painful wound which permits the



Fig 1



Fig 2



Fig 3

Fig 1 A normal immediate cholangiogram taken at the operating table¹ Fig 2 Immediate cholangiogram depicting a small stone at the lower end of the common duct which had not been palpable¹ Fig 3 An immediate cholangiogram depicting a rather large stone movable within the dilated common duct

the American Congress of Radiology in 1933 that he had been making injections into biliary fistulas since 1926, and a few years later he reported his experiences with cholangiograms in some 260 cases. In 1934, Best and Hicken (2-19-3-4-5-6-7) began to make routine studies of the biliary tract in all cases of postoperative drainage, and instituted cholangiograms at the operating table. They applied the term "immediate cholangiography" to the latter method of visualization and "delayed cholangiography" to those studies made postoperatively. Robins and Hermanson (45) presented an article in 1936 which described their technique for immediate cholangiography.

IMMEDIATE CHOLANGIOGRAPHY

Although Mirizzi (31-32) had presented his technique for visualizing the biliary tract at the operating table in 1932, Best and Hicken, not familiar with this contribution, began to experiment independently in 1934. Their interest in overlooked common-duct pathology was stimulated by Lahey (23) in an article wherein he made the following observations. In the period between 1910 and 1926, Lahey's group had opened the common ducts in 15 per cent of their cases of gall-bladder disease and had discovered stones in 84 per cent. They gradually began to explore the common duct more frequently until the period between 1930 and 1931 when 42.5 per cent of 138 cases operated upon were explored and stones

were discovered in 21 per cent. As these figures are compared, it is found that stones are present in approximately 50 per cent of the cases explored, regardless of the number. This is most enlightening and readily accounts for some of the unsatisfactory results following biliary surgery. Lahey also stated that 39 per cent of their cases with common-duct stones showed no jaundice. Best and Hicken, after several months' experience with postoperative cholangiography and after having demonstrated stones remaining in common ducts which had been thoroughly explored at operation, believed there was good reason for attempting immediate cholangiography as a means of diagnosing these elusive stones and thus avoiding incision into the common duct unless it was absolutely necessary. In their experience, immediate cholangiography has determined the presence of pathology when previous methods have failed. In view of the surgeon's fallibility in determining the status of the common duct by the usual methods, the question immediately arises as to whether or not cholangiography should be a routine procedure in biliary-tract surgery. The experience of others will more correctly evaluate it, as well as improve the technique. Best and Hicken set up their equipment for taking an immediate cholangiogram in almost every case and take one in 75 per cent of the cases which present no definite indication for opening the common duct. They open the duct only if there is a history of jaundice if there are palpable stones, if the duct is enlarged

¹From J Am M Ass 1936, 107 1616

SURGERY OF THE ABDOMEN

CHOLANGIOGRAPHY

Collective Review

R RUSSELL BEST M D Omaha, Nebraska

CHOLANGIOGRAPHY is the roentgenographic visualization of a part or the entire intrahepatic and extrahepatic biliary tract after injection of a contrast substance at the operating table or postoperatively through a drainage tube or fistula. In the early days, radiographic diagnosis of gall bladder disease was limited to those cases with visible stones, those with very thick walled gall bladders, and those in which a roentgenogram of the stomach or duodenum revealed a deformity suggestive of gall bladder contracture or pressure. Anatomical investigations of the biliary tract had been made by means of cadaver injections previous to the advent of roentgenology, but injection of radiopaque substances was not attempted as an aid to diagnosis until, on several occasions, instillations of opaque media for other conditions had accidentally caused parts of the biliary tract to become visible. In 1917, Quimby and Quimby (43) reported 2 cases in which the bismuth used in gastric studies had reached the gall bladder and produced an overlying shadow. In 1918, Reich (44) reported the case of a woman with a persistent draining sinus in the midaxillary line between the tenth and eleventh ribs which had followed incision and drainage of a fluctuant mass in this region two years previously. He had instilled 2 oz. of petrolatum and bismuth into the opening to ascertain the course of the tract and had obtained a partial outline of the intrahepatic and extrahepatic biliary ducts on x ray examination. A period with high temperature, jaundice, nausea, and vomiting ensued. Although this condition cleared up after several weeks and an x ray plate showed only a few remaining flakes of bismuth, such a reaction naturally discouraged further studies along this line. Burckhardt and Muller (9) in 1921 injected an opaque solution directly into the gall bladder through the abdominal wall but a moment's consideration of the danger involved in this procedure explains why it did not gain favor. The following year Tenney and Patton (49) demonstrated an obstruction at the lower end of the common duct by injecting an ex-

ternal biliary fistula with bismuth paste. The thick paste plugged the ducts however, and resulted in a transient cholangitis and jaundice which again inhibited the practical application of the procedure in this country. A little later in the same year, Carnot and Blaumontier (11) reported that they had obtained an outline of the entire biliary tree and revealed a stone in the cystic duct by injecting an external biliary fistula with barium mush. The injection of lipiodol into a hydatid cyst of the liver by Lanan and Squirri (44) in 1924 resulted in a silhouette of the biliary tract.

Graham and Cole (18) gave cholangiography to surgery in 1924, and since that time intensive study of gall bladder visualization has been made. As valuable a milestone as this was in surgery, and with the improvement in technique that naturally followed, it did not succeed in portraying the radicles of the liver or the hepatic and common ducts except in rare instances. An analysis of the poor results of biliary tract surgery will usually show that unrecognized hepatic or common duct pathology existed. In 1925, Cotte (12) revealed a calculus in the ampulla of Vater, by injecting lipiodol into an external biliary fistula. Piccirino and Paziensa (42) prophesied valuable application of this method in 1927 after demonstrating a stone in the lower portion of a common duct by means of 'gelobarium'. In the same year, Waltz (5) of Vienna reported the injection of 4 biliary fistulas. He stressed the value of proving the patency of the common duct as well as revealing the stones. Cotte (13) again discussed the injection of biliary fistulas and drainage tubes in 1929, and, in addition suggested the advisability of taking roentgenograms at the operating table. During the next three years various authors reported single instances or small groups of cases in which radiopaque substances had been injected into biliary fistulas or through remaining tubes or catheters but it was not until 1932 that Mirizzi (31-32) first related his experiences with visualizing the biliary tract at the operating table in 91 cases. Thorlakson (50) two years later reported his cholangiographic demonstration of choangiectasia and the improvement resulting from prolonged drainage. Saralegui (46-47-48) of Argentina stated before



Fig 4



Fig 5



Fig 6

Fig 4 Sixty c cm of lipiodine were injected into the external biliary fistula. The gall bladder appeared normal. The proximal $\frac{3}{4}$ of the cystic duct was visualized but exhibited some peculiar configurations that were taken to be the spiral valves of Heister. The distal $\frac{1}{4}$ of the duct was occluded. An organized bile-stained mucus plug was found to obstruct the cystic duct and it protruded into the neck of the gall bladder. Bile could enter the gall bladder but the ball valve action of the clot prevented its return through the cystic duct, hence the external fistula.¹

oil on the choledochal side of the sphincter of Oddi. Hippuran does not give as clear a contrast as the iodized oil, but it has proved very satisfactory and is now always used by the author. Thorotrast offers the highest radiographic density. It is not absorbed from the biliary or gastrointestinal tracts, which fact eliminates the possibility of any prolonged biological effect, and in the event of extra vasation into the hepatoduodenal ligament, the dye remains localized. According to the experimental work of Pohle, however, thorotrast in the peritoneal cavity would be taken up by the reticulo-endothelial system, but the biological disadvantages of this occurrence have not been decisively settled. Saralegui (46-47-48) reports the extensive use of thorotrast without untoward effects. The author has used thorotrast in 24 cases with no deleterious effects and believes it is harmless, although as stated above, he has abandoned its use until the controversies regarding its radioactive properties have been settled. An article by Hunt, Hicken, and Best (20) thoroughly reviews their experiences with the various radiopaque substances.

The first step in making a delayed cholangiogram is to withdraw, if possible, any residual bile

Fig 5 Delayed cholangiogram showing lower end of the common duct. Although the duct was dilated, the stone could not be palpated because the head of the pancreas was greatly thickened.

Fig 6 Multiple stones within the common duct, none of which were palpated at operation. Scooping, irrigation, and suction did not identify them. Recovery of the stones from the stool substantiated the cholangiographic findings.

from the biliary tract through the tube, catheter, or fistula with a sterile syringe. Then from 10 to 25 c cm of warm 48 per cent hippuran solution is slowly injected. If the pain becomes very marked, it means the tract is under pressure and is probably filled. If an iodized oil is used, it is warmed and diluted about one-third with sterile warm olive oil. Thorotrast should also be slightly warmed. Delayed cholangiograms can usually be taken after the seventh or eighth postoperative day, and can be repeated as necessary. The plate can be taken with the patient in his bed if he cannot be moved, or on a radiographic table if he is ambulatory. Occasionally, stereoscopic studies are necessary and Saralegui (46) even advised guiding and observing the process through the fluoroscopic screen. Ginzburg and Benjamin (17) do not inject in the presence of an elevated temperature, but Best and Hicken (2-19) have done so with no harmful effects. Warm iodized oil was used in these cases. However, it is probably better judgment to wait for the subsidence of any marked temperature, except in unusual instances.

INTERPRETATION

The presence of stones is most admirably shown by injection of radiopaque solutions into the biliary tract, and this fact accounts for most of the

¹From Ann Surg, 1936, 103, 2

and thickened, or if the head of the pancreas is thickened. Immediate cholangiograms have obviated the necessity of incising the duct when the history of jaundice is vague, or when the presence of stones is questionable unless definite evidence of pathology appears on the film.

Technique. Mirizzi (31) used an iodized oil in his studies. Best and Hicken in their early experiments used lipiodine and lipiodol, diluting them with olive oil and heating them to slightly above body temperature, from 115 to 120°. These oils were soon discontinued, however, for their viscosity made it difficult to introduce them through a small needle and it was thought their density might obscure the smaller stones. They found thorotrast to be a most satisfactory radiopaque substance but have ceased to use it until the controversy regarding its radio-activity is settled. It is easily handled, gives an excellent contrast and thus far no untoward effects have been noted from its use. More recently they have used a 48 per cent solution of hippuran, an organic iodine solution. Robins and Hermanson (45) also favor this substance. It is labile, affords a good contrast, but is possibly not as distinct as thorotrast. None of these solutions have appeared to be irritating.

Mirizzi usually injects through the stump of the cystic duct with a blunt needle which fits into the duct and has a tapering ball valve to prevent leakage or backflow. Robins and Hermanson inject directly into the common duct. Best and Hicken experimented with injections directly into the gall bladder and into the stump of the cystic duct but have found injection directly into the common duct to be the most practical (5). After the common duct has been identified with a 23 gauge needle on a 10 c cm. syringe, from 10 to 20 c cm. of a 48 per cent solution of hippuran is injected through a 23 gauge short beveled needle, 1 1/4 in. long, a bead 3/8 in. from the needle point lends security in locating the end of the needle so that it does not pierce the posterior wall of the common duct. After the needle is withdrawn the Allis clamps are released and the puncture wound is gently sponged. The towel clips at the upper angle of the wound are removed as they may overshadow the common duct. A large sterile sheet is thrown over the entire operative field, the mobile x-ray unit is brought into place and the cholangiogram is taken, developed, and interpreted before removal of the gall bladder is completed.

Best and Hicken (6) believe that they have cholangiographic evidence that the high mortality following cholecystogastrostomy or duodenostomy in cases of jaundice is due to an occluded cystic duct and suggest that if a probe cannot be

inserted through the gall bladder and cystic duct into the common duct, a cholangiogram should be made to determine the patency of the duct or better, a choledochoduodenostomy should be done. Mortality figures support this contention.

DELAYED CHOLANGIOGRAPHY

As discussed in the introductory paragraphs, delayed cholangiograms have not infrequently been made during the last fifteen years. In many instances just one or two cases are reported and the radiopaque solution was injected into a biliary fistula as a last resort in diagnosis. Cotte (13) in 1929 reported most favorably on the radiographic visualization of the biliary tract with lipiodol, emphasizing its injection through drainage tubes following cholecystostomy and cholecystectomy. Ginzburg and Benjamin (17) injected biliary fistulas with warm iodized oil, after aspirating the bile. Some of the tracts closed following these injections and they brought up the question of the therapeutic value of the oil. These authors did not believe, however, that the injections should be made in the presence of fever. In 1930 Gabriel (16) discussed the value of injecting lipiodol post-operatively to determine the patency of the common bile duct. Overholt (40) in 1931 reported 21 cases studied by injection of campidol into fistulas or through catheters. As stated before, Thorlakson's report (50) of 1934 demonstrated cholangiectasis and the desirability of prolonged drainage. He reported on 5 cases.

Best and Hicken (2, 10, 3, 4) began their studies in 1934 and in publications the following year strongly advised cholangiographic studies in every case with T tube or catheter drainage and in every fistula. Their earliest paper dealt with the value of cholangiography in depicting the presence of spasm at the lower end of the common duct, spastic biliary dyssynergia.

Technique. Although almost every contrast medium has been used, those with the firmly fixed iodine radical, as the iodized oils and the organic combination of iodide prepared for oral and intravenous urography have proved safe and satisfactory. The highly compact radiopacity of the iodized oils gives good contrast and is favored by many writers. However, they may obscure calculi, especially the smaller ones, and because the oil is not miscible with bile, isolated areas of imperfect filling may appear and make evaluation of the roentgenograms uncertain. The oils, however, seem to have certain therapeutic properties, as suggested by Ginzburg and Benjamin (17) and by Best and Hicken in their cholangiographic demonstration of the relaxing effect of fat or warm

this abnormal spasticity and minimize the unsatisfactory postoperative results. At the American Medical Association meeting in Kansas City in 1936, they produced cholangiographic evidence of spastic biliary dyssynergia and showed how the dyssynergia was often relieved by dissolving 1/100 gram of nitroglycerin under the tongue. The same year, McGowan, Butsch and Walters (27-28) presented their pressure studies of the common bile duct substantiating the presence of spasm of the lower end of the common duct and showing its release with amyl nitrite. In 1937, Doublet and Colp (15) reported further interesting studies which dealt with the resistance of the sphincter as shown by cholangiography and by pressure changes within the duct. From their experiments with instillation of dilute hydrochloric acid into the duodenum, they concluded that the acid caused a temporary sphincteric spasm, but that this could be prevented by atropinization. In a recent article on cholangiography, Best and Hicken gave cholangiographic evidence that they had dislodged stones from the common duct by relaxing the sphincter with alternate administrations of nitroglycerin and atropine and increasing the biliary pressure by stimulating the flow of bile with dehydrocholic acid (8).

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Fig 7 Note the marked dilatation of the bile ducts. An obstruction near the ampulla has prevented the lipiodine from entering the duodenum. Radiograms made three hours later indicated the pseudo obstruction had disappeared for the lipiodine was then in the jejunum. A spasm of the choledochal sphincter followed by a relaxation offers a probable explanation for this observation. (Unfortunately the three hour plate was destroyed.)

reports on this subject. Stones have been depicted singly or in numbers along the intrahepatic and extrahepatic ducts. A collection of air in the duct will occasionally appear as a stone but recheck of the cholangiogram will establish its identity. Since iodized oil does not mix with bile, an occasional unfilled area may simulate a stone, but recheck or the use of a non oily radiopaque medium will clarify the situation. Collections of inspissated bile, debris, or blood clots are usually quite irregular in shape and tend to shift their position. Stones as a rule have a sharper outline.

Strictures are apt to occur near or slightly below the junction of the cystic and common ducts and most frequently are the result of postoperative contractures. Adhesions not infrequently distort the outline or make it appear that a contracture is present. However if there is no dilatation above the level of the apparent narrowing it is probably not pathological. Buckling of the drainage tube may also give the appearance of a contracture. Patency of the common duct should be definitely established before the tube or the catheter is removed.

Cholangiectasis and dilatation of the hepatic ducts may be caused by a previous or existing obstruction or by infection. In gross dilatation a recheck would always be made to disprove the presence of an obstructing agent. The return of the dilated biliary tree to somewhere near its nor-



Fig 9 This shows the marked dilatation of the biliary tree that occurs with carcinoma of the head of the pancreas as depicted by cholangiography.

mal size is a means of determining when to remove the remaining drainage tube in the common duct. This has been stressed particularly by Thorlakson (50).

SPHINCTER OF ODDI (SPASTIC BILIARY DYSYNERGIA)

Oddi in 1837 (38, 39) in his original description of the choledochal sphincter, was of the opinion that spasm of the sphincter of the choledochus might be the cause of biliary colic or icterus. The work of Meltzer (30) and Lyon (25) in determining the effect of magnesium sulphate on the duodenal mucosa suggest the same spastic phenomenon. Berg (1), Nuboer (37), and Newman (36) observed hypertrophy of the sphincter, and Westphal (53) in 1923 went so far as to classify disorders of motility of the biliary tract into hyperkinetic and atonic types. In 1930, Nara, Muschel and Pavel (33, 34, 35, 41) published treatises on spasm of the sphincter as a cause of chronic icterus and chronic pancreatitis. Three years later Ivy, Voegtlin, and Greengard (21) further substantiated the existence of this phenomenon by a series of experiments on human beings. Saralegui (47) in 1935 showed a persistent spastic state of the sphincter of Oddi by cholangiographic studies. Simultaneously Best and Hicken presented their studies on spastic biliary dyssynergia with cholangiographic evidence of the varying degrees of spasm (2). They believed this to account for some of the persistent symptoms after cholecystectomy. Their article suggested that a postoperative medical regime including those substances which tend to relax the sphincter might correct

Before asepsis, tetanus of the newborn from umbilical infection was rather common. The condition is still said to occur in isolated areas of China where road dust is used as a dusting powder on the umbilical wound. The symptoms and signs of tetanus in the newborn do not differ materially from the syndrome in the adult.

Cullen was unwilling to consider any of the cases of probable syphilis of the umbilicus in the newborn as proved. No positive dark-field examinations were made from material from the "umbilical chancres." The diagnosis cannot well be doubted in the presence of the following: a positive Wassermann reaction, positive dark-field examinations of material from the umbilical lesion, the finding of spirochetes in sections of tissue, and pathological signs of congenital syphilis, such as osteochondritis. Many of the earlier cases may have been true instances of syphilis. The ulcer of the navel of syphilitic origin is not unlike a chancre with a round, sharply limited edge and some induration. The treatment consists of anti-syphilitic therapy and local cleanliness. The prognosis is fair.

Cullen did not mention any proved case of tuberculosis of the umbilicus in the neonatal period, although placental transmission of bacillus tuberculosis to the newborn probably occurs (McCord). Hunt has failed to find mention in the literature of a tuberculous umbilical lesion of neonatal infants.

Hemorrhage from the navel of a newborn infant is a rare but grave condition. Syphilis of the umbilicus frequently has been mentioned as of importance in its cause. Non-specific infection may play some part in the course of umbilical hemorrhage, as it may in any secondary hemorrhage after the ligation or suture of a blood vessel. Hunt has encountered 2 cases in which infection of this nature may have played a part. Blood dyscrasias have been causative of umbilical hemorrhage, and in cases of melena neonatorum hemorrhage may be from the cord. In these 2 diseases the hemorrhages are multiple and usually from other regions than the cord. Therapeutic measures such as compression, injection of hemoplastic substances, or injections of blood usually are unsuccessful. Suture and electrocoagulation often are of only temporary help. Blood packs or gauze sponges saturated with fresh, whole blood of a non-syphilitic donor often control troublesome oozing of circumcision wounds and would be worthy of trial in cases of umbilical hemorrhage. The best means of control of this type of hemorrhage is blood transfusion. One of the citrate methods is usually easier to use than the direct method. If the bleeding does not cease soon with simple local measures, transfusion should not be delayed. If the hemorrhage has not been severe, from 15 to 25 c cm will be sufficient for hemostasis. If any considerable volume is given the donor should be of the same type as the recipient, as with the small blood volume of the newborn there is some likelihood of agglutination of the recipient's cells by the donor's serum.

The most common anomalies of the umbilicus result from developmental defects of the omphalomesenteric duct and urachus.

There are no subjective symptoms from umbilical polyps, although they bleed slightly when irritated, or may cause purulent discharge if infected. They are reddish, raised lesions, firm and elastic, varying in diameter from 0.5 cm to 3 cm. or more. There may be a pedicle at the base. Histologically, the polyp is covered by typical intestinal mucosa. The central portion usually contains non-striated muscle and connective tissue.

The best treatment for polyps is surgical excision, as cauterization often fails to destroy them completely. Ligation, if a pedicle is present, may be effective.

Many of the polyps described have a canal in their substance which communicates, through a Meckel's diverticulum, with the ileum a short distance from the ileocecal valve. The caliber of this fistulous canal may vary. The discharge from these fistulas may be only mucoid, but often feces also appear in varying amounts. Chemical tests may prove the presence of feces. A probe can be passed into the bowel or, better, the continuity of the opening with the bowel can be established by the injection of barium and roentgenological visualization.

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Warning should be given to the parents of infants who give evidence of persistence of the omphalomesenteric duct. Such infants face the constant possibility of intestinal obstruction if surgical correction is postponed or declined.

Remnants of the omphalomesenteric vessels may occasionally give rise to umbilical fistulas and may cause intestinal obstruction.

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ABDOMINAL WALL AND PERITONEUM

Burdick C. G. Gillespie D. H. M. and Higenbotham N. L. Fascial Suture Operations for Hernia *Ann Surg* 1937 106 313

Burdick Gillespie and Higenbotham reporting from their statistics at the Hospital for Ruptured and Crippled New York state that fascia of some kind was used in 1453 operations for hernia during the period from 1924 to 1933. They are able to report on about 50 per cent of these cases which have been followed for from one to twelve years.

There were 71 non-operative deaths and 23 operative deaths. Pneumonia was the cause of death in 9 cases. Autogenous fascia was used in 1253 cases of fascia in 231 and homologous fascia in 201. There were 233 infected wounds in the series. Of these 92 occurred in cases in which autogenous fascia was used, 23 with homologous fascia and 28 with ox fascia. There were recurrences in 29.1 per cent of 975 cases which were followed up. More than half of the recurrences were found after a year.

In many patients that were reoperated upon slight evidence of the fascia formerly used could be found and the authors concluded that many of the sutures were eventually absorbed. This factor no doubt contributed to the recurrence rate, which is too high. Also the drawing of a large needle threaded with bulky fascia through the transversalis fascia and Poupart's ligament produces a weak spot which predisposes to a recurrence. Two years ago the authors adopted the silk technique and no longer use fascia except in large ventral hernias in which the pedicled fascial flap can be employed. EARL GARRISON M.D.

Hunt A. B. Diseases of the Umbilicus of the Newborn Infant *Surg Clin North Am* 1937 11 1187

Simple granulation tissue with delayed healing of the umbilical stump is much the commonest disease of the umbilicus of the newborn. Mild pathogenic or non pathogenic infections are probably the causes of the majority of cases and healing results promptly from cauterization with the silver nitrate stick or even from the application of sterile alcohol dressings. If healing does not follow the foregoing methods of treatment if there is bleeding or if feces urine or bile stained fluid is discharged from the navel closer examination for an anomaly should be made.

In the majority of cases some variety of the streptococcus is the causative organism. Next in order are the staphylococcus colon bacillus, pneumococcus bacillus pyocyanus, and tetanus bacillus. Infection takes place during the suturing and cutting of the cord or from subsequent contamination in dressing especially when the stump of the cord is moist.

There is no typical syndrome and both the clinical and pathological pictures of umbilical sepsis may be extremely varied. On inspection of the umbilicus there may be the usual and gross typical of inflammation or the infection may be masked by superficial healing. The infant usually appears well

for several days, then signs of infection appear ushered in by fretfulness, loss of weight and fever. As the disease advances evidences of metastatic infection or pyemia may be evident in the joints or lymph nodes. If there is evident infection of the umbilicus with induration and cellulitis gangrene or erysipelas of the abdominal wall often develops.

In addition to the red indurated appearance of the gangrene of the umbilical area ulceration and pus may be present. At autopsy there is sometimes phlebitis of the umbilical vein or more often arteritis involving the umbilical arteries usually the changes are demonstrated only on microscopic examination. The liver by virtue of its intimate connection with the circulation to the fetus from the umbilical vein frequently bears the brunt of spreading umbilical infection from progressive umbilical phlebitis or it may become infected even in the absence of phlebitis. Febrile jaundice of the newborn might be demonstrated more frequently on careful necropsy as having its origin in umbilical sepsis.

In the lungs umbilical infection may cause pneumonia of the hemorrhagic type with septic gangrenous infarction.

Undoubtedly in many instances sepsis from the umbilicus may result in true septicemia and peritonitis may result rather commonly.

Less common foci of umbilical infection are the brain and kidneys. Conditions which result in many deaths of the newborn from evident or unrecognized umbilical infection must go undiagnosed and many which are diagnosed are obviously not reported in the literature.

Routine care of the cord is therefore a very important step in any delivery. The stump of the cord should be touched with alcohol or a weak alcoholic solution of iodine from 0.5 to 1 per cent before the sterile alcoholic dressing is applied. In The Mayo Clinic it is routine for the assistant who has not been as actively engaged in the delivery as the operator to care for the cord. The Ziegler clamp has been used with satisfactory results, especially in the control of delayed hemorrhage from loose cord ties. If ties are used a wide tape prevents cutting of the vessel, and double ligation with square knots one on each side of the cord is advisable.

Sixty three cases of diphtheria of the umbilicus of the newborn have been reported almost all of them since Cullen published his book in 1916. This is truly an affliction of the newborn as are all of the infections developed by the end of the third week of life. The clinical course is of interest as the infant appears healthy takes nourishment well and is afebrile for days between the onset of the disease and subsequent death. A diphtheritic membrane may be present. Because of this atypical picture of grave infection the diagnosis may easily be missed unless diphtheria is kept in mind and a culture is taken from the infected navel. The prognosis is serious but with the present use of antitoxin it is much better. The time element of course is important in the administration of antitoxin.

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genital anomalies of the navel is much more frequently encountered in males than in females. There is no impairment of health of the infant. If urine has drained through or along the open urachus one should be sure there is a patent, functioning urethra before surgical excision of the urachal tract is attempted. Excision is the treatment of choice and is also of value because of its prophylaxis against malignancy of the urachus later in life.

Congenital umbilical hernia is not, in a strict sense a hernia; there is no outpocketing of structures through a defect. Rather, the bowel has developed outside of the somatic cavity and by defective closure of the abdominal wall at the umbilicus has been left outside of the peritoneal cavity. A membrane of amnion and peritoneum may cover the bowel. Surgical repair of the defective abdomen has saved several infants. The defect may be too large to permit closure. There may be a hernia of bowel or omentum into the umbilical cord. One should always be watchful for prolapse of the bowel in the cord when the cord is ligated at birth, otherwise actual excision or ligation of a portion of the ileum may take place.

Umbilical neoplasms have been classified as arising from anomalous rests although this may not be universally true. The most common tumor is probably the angioma. Erectile tissue may be present. Dermoids in the newborn have been mentioned. Cysts of the urachus and omphalomesenteric duct have been reported in older individuals and in the fetus and embryo but no reports of the cysts in the newborn have been encountered in the present review.

True malignancy of either the omphalomesenteric duct or the urachal remnants has not been reported in patients less than twenty-five years of age. Microscopic examination of the umbilicus of the newborn may establish valuable medicolegal evidence as to the age of the infant, especially in cases of suspected infanticide.

While this discussion has been limited to the umbilicus of the newborn there exists a larger literature concerning lesions encountered in older children and adults. In many of the cases the diseases were present since birth and treatment was deferred for months or years so that the importance of umbilical pathology is not truly evident from perusal of the literature pertaining alone to the newborn infant.

GASTRO INTESTINAL TRACT

Bergh C S, Bowers W F and Wangensieen O H. Perforation of the Gastro Intestinal Tract. An Experimental Study of Factors Influencing the Development of Peritonitis. *Surgery* 1937 2 196.

The authors performed experimental perforation of the gastro intestinal tract at various levels on 125 animals in an attempt to study some of the factors influencing the development of the consequence of

peritonitis. Perforation of the empty stomach was carried out in 29 animals with the development of peritonitis in 2, or a mortality of 6.9 per cent. Perforation of the empty stomach through an area previously injected with a sclerosing solution produced an edema and was carried out in 10 dogs with the development of peritonitis in 4, or a mortality of 40 per cent. Autopsies revealed that the perforations had failed to heal in these fatal cases. The authors attribute this to the edema and infiltration produced by the injection and call attention to similar conditions existing in the presence of peptic ulcer. Of 30 animals with stomachs containing food at the time of perforation, 26 died from the resulting peritonitis, a mortality of 86.7 per cent. In the small intestine perforation of the duodenum resulted in a mortality of 81.2 per cent, perforation of the jejunum in a mortality of 44.4 per cent, and perforation of the terminal ileum in a mortality of 100 per cent. The mortality following perforation of the large bowel was 23.1 per cent.

The authors state that the factors that determine the mortality in experimental perforations are similar to those observed clinically, namely the number and virulence of the escaping organisms and the resistance of the host. According to the authors the former factor is governed by the size of the perforation, the length of time the perforation remains open, the number of organisms at the level of the perforation which is determined by the site of the perforation and the length of time after the ingestion of food the amount and solidity of material in the viscus at the time of perforation and the forces tending to carry the contents of the viscus out into the peritoneal cavity. The second factor, i.e. the resistance of the host is determined by the general and local factors.

ALTON OLIVER, M.D.

Careddu G and Olper L. Hypertrophic Pyloric Stenosis of the Newborn and Suckling (*La stenosi ipertrofica del piloro nel neonato e nel lattante*). *Arch Ital di mal dell'appar digerente* 1937 6 201.

The authors report the records of 7 patients with hypertrophic pyloric stenosis from the Pediatric Clinic of Padua. Except in the province of Venice this condition is uncommon in Italy, and has not been described often in the Italian literature. For this reason the authors present a detailed consideration of the entire subject.

They consider the cause and pathogenesis in detail. The necessity for close collaboration between the pediatrician and the surgeon is stressed. The condition lends itself to rather exact diagnosis usually on the basis of clinical symptoms alone. In doubtful cases the roentgenological examinations allow for a clear decision. Roentgen ray examination has been of value also in the very early diagnosis before clinical signs are marked.

The medical treatment of this condition should be limited to patients with very mild symptoms and applied to others during the period of observation.

while the diagnosis is being determined. Surgical treatment should be applied as early as possible. The surgical treatment of choice is that described by Fredet and Ramstedt. The operation is simple, the mortality is low, and the results are excellent.

A. Louis Rost, M.D.

Page, R. C., and Rankin, L. M.: Review of Ulcer Surgery at Presbyterian Hospital (Philadelphia, Pennsylvania). *Am J Surg*, 1937, 37, 219.

From 1921 to March, 1935, there were admitted to the Presbyterian Hospital in Philadelphia, Pennsylvania, 415 cases of peptic ulcer, 209 of which were medical and 206 surgical. There were 125 cases in which surgery was elected. The operations were as follows:

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Pyloroplasty of Heineke and Mikulicz with Judd modification	1
Finney pyloroplasty with associated repair of marginal ulcer	1
Heostomy followed in fourteen days by a posterior gastro-enterostomy	1
Total	125

The average stay in the hospital was 19.45 days. Twenty or 16 per cent of the patients suffered complications, and twenty-one or 16 per cent died.

Five of the 21 deaths were due to mechanical obstruction, 5 to myocardial failure with terminal pulmonary edema, and 6 to pneumonia. The actual mortality following gastro-enterostomy in this series was 12.7 per cent. The authors note that Woolsey reports a mortality of 2.7 per cent and that Mayo states that the mortality of gastro-enterostomy in all cases of ulcer, perforating, chronic, and acute, is 2.85 per cent. "Whether or not these figures represent both the surgical mortality and the deaths resulting from chest complications, etc., we have not been able to ascertain." Four of the 5 patients on whom a partial gastrectomy was performed died.

There were a total of 79 perforated gastroduodenal ulcers, 32 (40.2 per cent) of which were closed either by simple closure, cautery, or inversion. Posterior gastro-enterostomy was added to the above procedure in 14 cases. It was of interest to note that 21 of

35 patients with acute perforation operated upon within the six-hour limit experienced no postoperative complications and had an average duration of hospitalization of twenty days. In the remaining patients intestinal obstruction occurred twice, partial evisceration once, complete evisceration once, wound infection twice, and pneumonia once. No patient operated upon after the twenty-four-hour period recovered. Six patients with perforation were admitted in shock and died without operative interference. One of the patients operated upon within the six-hour period died from lobar pneumonia, 1 from a subdiaphragmatic abscess, 3 additional patients with duodenal perforation operated upon within six to twelve hours died of generalized peritonitis. One patient died from bronchopneumonia sixteen days following operation and 1 from an auricular fibrillation with terminal pulmonary edema.

The mortality for all perforations was 7.5 per cent when operated upon within six hours, 35.7 per cent when operated upon from six to twelve hours following perforation, 81.8 per cent when operated upon from twelve to twenty-four hours later, and 100 per cent when operated upon more than twenty-four hours after perforation. The average operative mortality was 31.8 per cent.

In conclusion the authors emphasize the necessity of a correct early diagnosis which will permit early operative interference with its attendant low mortality and diminution of postoperative complications. In addition, emphasis is placed upon postoperative management because 32.8 per cent of the patients with elected surgery suffered from some postoperative complications, in which respiratory and chest involvement played a significant rôle. If it were possible to reduce the number of these complications the general postoperative course would be much smoother, the mortality lower, and the financial liability on both the patient and hospital proportionately decreased. SAMUEL J. FOGELSON, M.D.

Finsterer, H.: The Results Obtained in More than 200 Patients with Gastrojejunal Ulcer Operated Upon by the Author (Erfahrungen bei ueber 200 selbst ausgefuehrten Radikaloperationen wegen Ulcus pepticum jejunum). *61 Tag d. deutsch. Ges. f. Chir.*, Berlin, 1937.

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Most of the patients, 74.5 per cent, were under fifty years of age, and after the sixtieth year only the most urgent indications, such as hemorrhage, perforation, or colon fistula were considered surgical.

genital anomalies of the navel is much more frequently encountered in males than in females. There is no impairment of health of the infant. If urine has drained through or along the open urachus one should be sure there is a patent functioning urethra before surgical excision of the urachal tract is attempted. Excision is the treatment of choice and is also of value because of its prophylaxis against malignancy of the urachus later in life.

Congenital umbilical hernia is not in a strict sense, a hernia; there is no outpocketing of structures through a defect. Rather the bowel has developed outside of the somatic cavity and by defective closure of the abdominal wall at the umbilicus has been left outside of the peritoneal cavity. A membrane of amnion and peritoneum may cover the bowel. Surgical repair of the defective abdomen has saved several infants. The defect may be too large to permit closure. There may be a hernia of bowel or omentum into the umbilical cord. One should always be watchful for prolapse of the bowel in the cord when the cord is ligated at birth; otherwise actual excision or ligation of a portion of the ileum may take place.

Umbilical neoplasms have been classified as arising from anomalous rests although this may not be universally true. The most common tumor is probably the angioma. Erectile tissue may be present. Dermoids in the newborn have been mentioned. Cysts of the urachus and omphalomesenteric duct have been reported in older individuals and in the fetus and embryo but no reports of the cysts in the newborn have been encountered in the present review.

True malignancy of either the omphalomesenteric duct or the urachal remnants has not been reported in patients less than twenty-five years of age. Microscopic examination of the umbilicus of the newborn may establish valuable medicolegal evidence as to the age of the infant, especially in cases of suspected infanticide.

While this discussion has been limited to the umbilicus of the newborn there exists a larger literature concerning lesions encountered in older children and adults. In many of the cases the diseases were present since birth and treatment was deferred for months or years so that the importance of umbilical pathology is not truly evident from perusal of the literature pertaining alone to the newborn infant.

GASTRO INTESTINAL TRACT

Bergh G S, Bowers W F and Wangenstein O H. Perforation of the Gastro Intestinal Tract. An Experimental Study of Factors Influencing the Development of Peritonitis. *Surgery* 1937 2 196.

The authors performed experimental perforation of the gastro intestinal tract at various levels on 145 animals in an attempt to study some of the factors influencing the development of the consequence of

peritonitis. Perforation of the empty stomach was carried out in 29 animals with the development of peritonitis in 3 or a mortality of 6.9 per cent. Perforation of the empty stomach through an area previously injected with a sclerosing solution produced an edema and was carried out in 10 dogs with the development of peritonitis in 4 or a mortality of 40 per cent. Autopsies revealed that the perforations had failed to heal in these fatal cases. The authors attribute this to the edema and infiltration produced by the injection and call attention to similar conditions existing in the presence of peptic ulcer. Of 30 animals with stomachs containing food at the time of perforation 26 died from the resulting peritonitis, a mortality of 86.7 per cent. In the small intestine perforation of the duodenum resulted in a mortality of 81.2 per cent, perforation of the jejunum in a mortality of 44.4 per cent, and perforation of the terminal ileum in a mortality of 100 per cent. The mortality following perforation of the large bowel was 23.1 per cent.

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Most of the patients, 74.5 per cent, were under fifty years of age, and after the sixtieth year only the most urgent indications, such as hemorrhage, perforation, or colon fistula were considered surgical.

indications. There were 14 patients over sixty years of age who were operated upon with 4 deaths.

Following gastro-enterostomy the patients were operated upon as soon as possible after the marginal ulcer appeared. Medical management was tried first in those cases which occurred after resection because in this type of patient healing may follow. In the radical operation at least two thirds of the stomach, the old duodenal ulcer, the pylorus and the loop of bowel used for the original anastomosis were resected then the jejunal loops were anastomosed end to end and the stomach anastomosed to the jejunum end to side by a modified Hofmeister Finsterer procedure.

However, the Billroth I anastomosis, or the Haberer modification (terminolateral gastroduodenostomy) between the duodenum and the stump of the stomach was used only in the non penetrating type of ulcers in cases with a wide duodenum and a ptotic stomach. Despite these precautions this procedure had a high mortality 4 deaths occurring in 34 cases.

In the gastrojejunal ulcers occurring after posterior gastro-enterostomy and not complicated by hemorrhage, perforation or fistula of the colon the mortality was 6.5 per cent 7 deaths in 108 cases. When an anastomosis of the Hofmeister Finsterer type was used the mortality dropped to 5 per cent 4 deaths in 82 cases which is therefore only slightly higher than the mortality of the customary type of surgery resection of the ulcer. On the other hand in the cases of gastrojejunal ulcer following resection the mortality of radical operation was much higher 5 deaths in 25 cases or 20 per cent. Radical resection for recurrence of gastrojejunal ulcers had a mortality of 16.6 per cent 2 deaths in 12 cases.

Following perforation the results obtained were poor. Both patients operated upon died. Similarly unsatisfactory results were obtained in cases complicated by acute profuse hemorrhage. In cases of this type which were operated upon late there were 4 deaths in 5 cases whereas in 4 others operated upon early the results were good as all 4 cases recovered.

Gastrojejunal colon fistula had a high mortality 17 patients were operated upon with 6 deaths a mortality of 35.2 per cent. This mortality occurred not only when the colon was resected at the same time as was done in 11 cases with 4 deaths but also when the colon was separated and closed which was done in 6 cases with 2 deaths.

The type of anesthesia has a marked influence upon the operative mortality. General anesthesia was used as little as possible being replaced by local anesthesia either mesenteric or splanchnic. Of 176 cases operated upon under splanchnic anesthesia it was possible to operate on 130 73.8 per cent without ether supplementation. In the remaining cases ether was used before the splanchnic anesthesia to separate the adhesions and only in 7 cases were more than 150 cc. of ether used. In these cases there were no deaths from pulmonary inflammation even though 12 of the patients were from sixty to seventy

eight years old. Two of the latter died 1 from volvulus of the sigmoid and 1 from peritonitis.

The best permanent end results were obtained with extensive gastric resection and anastomosis of the Hofmeister Finsterer type. Fifty cases were completely healed, in 5 the condition was markedly improved and none presented failure. However of 22 cases in which the modified Billroth I method of von Haberer was used only 18 were cured in 1 the condition was markedly improved and in 4 or 13.6 per cent, it remained unimproved. The poorest results were obtained with the Y type of anastomosis which was employed in 27 cases of which only 7 were cured in 1 the condition was improved and in 13 or 61.9 per cent it remained unimproved. Of these 13 patients still having gastrojejunal ulcer 6 were again operated upon after either hemorrhage or pain recurred. The Y type of anastomosis which was condemned by the author in 1924 has not been used in the last thirteen years. In the Y type of anastomosis it is necessary to remove even more of the stomach in order to achieve permanent healing.

The author performed a radical operation with "Y" anastomosis for gastrojejunal ulcers which occurred after gastro-enterostomy in two brothers in 1919 and found it necessary to operate for recurrent gastrojejunal ulcer in 1921. At this time he left only one fifth of the stomach and again established gastro intestinal continuity by a Y type of anastomosis. Both of the brothers have remained well now for fifteen and one half years.

In 14 cases of recurrent gastrojejunal ulcer a Y type of anastomosis was performed 10 times anterior gastro-enterostomy with entero anastomosis 3 times and resection of the antrum once.

There were 8 cases in which from 3 to 7 operations had been done. These cases were described by Mandl as being surgically incurable but through a new resection and avoidance of the Y type of anastomosis permanent healing was achieved.

Gastrojejunal ulcer should be prevented as far as possible by the avoidance of gastro-enterostomy and by resection of at least two thirds of the stomach so that only the normal cardiac third remains. The Y type of anastomosis as well as entero anastomosis should be avoided not only in resection for ulcer but also in resection for exclusion.

In the discussion Ales andri said that in the last twenty years 113 cases of postoperative jejunal ulcer were studied by him and his associates. Ninety two occurred after gastro-enterostomy and 21 followed resection. In 13 additional cases the development of recurrences was studied. It was possible therefore to report on 126 cases 87 per cent of which occurred in men. With the exception of 4 cases of gastric ulcer the primary lesion was almost always a far advanced calloused penetrating duodenal lesion. Jejunal ulcer following resection has become more frequent in the last few years. The first case was observed and operated upon in 1924. In 1936 there were 6 cases and in the first months of 1937 there have been 3 cases.

The Reichel-Polya type of resection which is used by Alessandri is followed by the smallest number of postoperative jejunal ulcers. Most of the postoperative ulcers were treated by further resection. Gastro-intestinal continuity was reestablished in 2 cases by a Roux gastro-enterostomy and in 6 cases by an ante-colic type of anastomosis. In 4 cases a Billroth I operation was done, in 3 a modified von Haberer-Billroth I operation. Extensive resection is of marked importance. The outer border for the resection should be at the origin of the gastric artery and the ulcer itself should always be removed. After such an extensive resection the frequency of postoperative peptic ulcer is 1.4 per cent.

Alessandri has also had the opportunity of operating upon 2 cases of perforated postoperative jejunal ulcer. Both occurred following a resection with an ante-colic gastro-enterostomy. In both cases resection had been done for a perforated duodenal ulcer. Both patients recovered after the radical intervention. In a third case, which is reported because of its infrequency, a postoperative perforated peptic ulcer occurred following a gastroduodenostomy of the Judd type.

Perforation is a rare complication of postoperative peptic ulcer. It occurred approximately 5 per cent of the time. The frequency of penetration into the colon, mesentery, mesocolon, and anterior abdominal wall was somewhat higher.

Alessandri treats postoperative peptic jejunal ulcers with a radical extensive gastroduodenal resection. Then an end-to-end jejunojejunostomy and an end-to-side transmesocolon total gastroyejunostomy with the oral loop of the bowel approximating the smaller curvature is done.

Alessandri has performed the described operation 55 times. Twelve times a gastroduodenostomy of the von Haberer type was done, but this procedure is not only more difficult, but it also prevents adequate extensive resection. In one patient treated in this manner there was a second recurrence.

Other types of intervention, such as anastomosis according to Braun and degastro-enterostomy, did not prove satisfactory. Reactivation of the old ulcer may follow the latter. Substitution of a new gastro-enterostomy for the old or resecting only the jejunum is not to be recommended.

He reported an interesting case in which the patient had had 4 gastric resections followed every time by a recurrent peptic ulcer. In the above patient he obtained permanent healing. In cases in which postoperative peptic ulceration occurs it is essential to perform a radical operation similar in nature to that done for recurrent ulcers after gastro-enterostomy. A considerable part of the remaining stomach must be resected as well as the involved jejunum. Then the jejunum should be anastomosed end-to-end and a retrocolic gastro-enterostomy performed.

The operative mortality after gastro-enterostomy, as well as after resection, was 15.3 per cent. After a less radical method it was less, 9 per cent, but the

results were not as satisfactory. The high mortality is due to the technical difficulties, adhesions, penetration of the ulcer, the time required for the operation, and the fact that the patients are very ill when they come to operation. However, the mortality has become lower in the last few years, and the radical procedure is the only one which holds any possibility for permanent healing. SAMUEL J. FOGELSON, M.D.

Santas, A. A. Benign Tumors of the Stomach (Tumores benignos del estómago) *Bol. inst. de clín. quir.*, Univ. de Buenos Aires, 1937, 13, 37.

Santas gives a general review of benign tumors of the stomach based on the literature and reports 3 cases of gastric adenoma operated on at the Institute of Clinical Surgery, Buenos Aires.

The first case was that of a man fifty-one years old. The symptoms, pain after eating and digestive disturbances, had lasted nine years. The clinical diagnosis was duodenal ulcer. The final diagnosis was ulcer of the lesser curvature with an adjacent submucous adenomyoma containing inclusions of pancreatic tissue.

The second patient was a woman, aged fifty-eight, who for three months had had persistent eructations, slight pain after eating, and episodes of nausea, vomiting, and violent pain in the right hypochondrium radiating to the shoulder. The roentgenograms showed loss of substance in the region of the antrum. The clinical diagnosis was early carcinoma. At operation a pedunculated, ulcerated adenomatous polyp, the size of a filbert, was found. This case shows that a small benign tumor of the gastric mucosa can produce retention and give the roentgenological picture of cancer.

The third case was that of a man thirty-seven years old. He had had attacks of painless bloody diarrhea for one year, and was cachectic and markedly anemic. The roentgenogram showed loss of substance in the middle part of the greater curvature. An ulcerated, pedunculated adenoma, in some areas approaching adenocarcinoma, was removed.

The immediate results of operation were good in all the cases.

The histories are illustrated by roentgenograms and photomicrographs. The article contains a comprehensive bibliography. M. E. MORSE, M.D.

De Marchi, E. Perforated Peptic Ulcer of Meckel's Diverticulum (Ulcera peptica perforata del diverticolo di Meckel) *Arch. ital. di mal. dell'appar. digerente*, 1937, 6, 282.

Lesions of Meckel's diverticulum are not diagnosed usually because of their symptomatic similarity to other intra-abdominal lesions. Yet, disorders of Meckel's diverticulum often are serious. The common and relatively asymptomatic nature of the process coupled with the seriousness of its complications makes the treatment particularly difficult.

The author presents a short review of the literature of the subject. Meckel's diverticulum is present

in from 2 to 3 per cent of human beings. Its size and type may vary widely from the patent connection between the umbilicus and the intestine to the complete fibrous obliteration of this embryological connection. Most often it forms a small appendage to the ileum situated from 30 to 90 cm proximal to the ileocecal valve. The diverticulum usually originates from the antimesenteric border of the ileum but occasionally it is lateral.

The structure of the diverticulum is usually like that of the normal intestine. Variations may consist of an absence of the muscularis or of greatest importance, the presence of pieces of mucosa which have a structure exactly like the gastric peptic mucosa. Other ectopic tissues which have been noted in the diverticulum include pancreatic acini and parotid gland tissue.

The presence of the peptic like mucosa is important because a peptic ulcer may develop. The explanation of the presence of this peptic mucosa in inclusion is not clear. Some investigators believe that its origin is embryonic, others that it is metaplastic.

The author reports statistics which indicate the great variability of the symptoms of Meckel's diverticulum. The pathological lesions of the diverticulum include peptic ulcer, acute and chronic inflammation, herniations, fistulas, tumors, calculi, typhoidal perforations, tuberculosis, trauma and torsion.

Peptic ulcer of Meckel's diverticulum has been recognized as a clinical entity for only about twenty years. It occurs predominantly in males. Of 66 patients, 27 were nursing babies and 39 were from two to fourteen years of age. The ulcer is situated almost invariably on the margin between the ectopic gastric mucosa and the intestinal mucosa. Whether the secretion of acid alone is sufficient to cause the ulcer is not established, for it is possible that any acid would be neutralized by the alkaline contents of the intestine. Other factors may prevail. Among these are absence in the diverticulum of an anti-peptic foundation normally present in the gastric mucosa, vascular changes including thrombosis, embolism or spasm, nervous factors on a toxic or mycotic basis, and anaphylaxis and infection.

The diagnosis before rupture of the ulcer is difficult. The presence of intestinal hemorrhage is most important. These hemorrhages tend to be periodic rather than continuous and they may be silent but often are accompanied by colicky abdominal pains.

The treatment of these patients is not always easy. In the presence of peritonitis and rupture, operation is indicated. If the diagnosis is made before perforation, treatment may be conservative, especially in the very early years of life when surgical intervention is not well tolerated. A. Louis Roast, M.D.

Connell, F. G. The Etiology of Appendicitis. *Am J Surg* 1937 37 232.

Attention is directed to the existing confusion concerning the cause of appendicitis. A distinction be-

tween appendicitis *per se* and appendicitis with perforation and peritonitis is important. Appendicitis is considered a result of the sequence of obstruction, distention, circulatory stasis, and infection.

Obstruction is recognized as an important cause of appendicitis and prompts an inquiry as to the cause of the obstruction which may be:

- (1) a foreign body, a mucus plug, edema or neoplasm,
- (2) stricture, stasis, angulation, or deformity or
- (3) functional derangement or spasm.

The *modus operandi* of (1) and (2) is quite obvious. The third cause is explained as follows:

The striking difference of the ileocecal region from all other gastro-intestinal areas is that the parasympathetic distribution is double, which fact permits the possibility of over-innervation or under-innervation.

Sympathetic-parasympathetic imbalance is a possible cause of hypertonicity or hypotonicity at the juncture of the cecum and the appendix. The existence of a true sphincter, Gerlach's valve, at this point has been denied, but circular muscle and extrinsic and intrinsic nerve supply, the necessary factors are present.

Malfunction in the foregut and hindgut, cardio-spasm and pylorospasm, and colon and rectal spasm are distinct clinical entities and a similar disturbance might rationally take place in the midgut.

The difference in hydraulics, one organ forming a cul-de-sac and the other having a double open end may account for some of the clinical differences.

Dyskinesia of the sphincter of Oddi, which is adjacent to the pylorus, is recognized similar dysfunction at the appendiceocecal junction, which is adjacent to the ileocecal valve, is theoretically plausible.

The difference in the contents, one septic and the other comparatively sterile, may partially account for different clinical courses.

It seems justifiable to the author to assume that disturbance of the autonomic nervous balance might cause spasm or hypertonicity of the neuromusculature at the appendiceocecal juncture, which spasm might help to account for the obstruction that caused a certain proportion of the cases of appendicitis.

With our present knowledge, it seems very probable that over-parasympathetic or under-parasympathetic innervation of the ileocecal region is due to variations in embryological development.

LOUIS SPERLING, M.D.

Kirschner, M. The Treatment of Carcinoma of the Rectum. (*Die Behandlung des Rectumcarcinoms*). *Vierteljahrsschrift für Krebsheilkunde* 1937 95 113.

According to Westhues, the relation of papillomas to carcinomas is of decisive importance from the standpoint of pathological anatomy. The distribution of the two in the three main segments of the rectum is the same. The transition from benign papilloma to carcinoma is proved. Polyps are therefore to be reckoned as possibly precancerous structures and should be removed early and thoroughly. The

extirpation of a carcinomatous bowel must be carried out in the oral direction as far as the sigmoid, in order to remove any polyps which may be present there as a prophylactic measure. Carcinoma of the rectum metastasizes chiefly in the proximal direction from the primary tumor in the area supplied by the superior hemorrhoidal artery. The tissue around this area must therefore be removed as thoroughly as possible and, when conditions indicate its advisability, the ablation should include also the retroperitoneal tissue in front of the spinal column, which procedure is possible only by the abdominal route. The resection line may be laid down immediately distal to the carcinoma.

The author's material comprises 282 cases from the years from 1920 to 1933, arranged by Paessler in *Chirurg*, 1935. Information is given on the fate of the patients after radical operation and after conservative treatment. At first the outcome in patients not operated on is better. Not till the end of the third year do the two curves, that of the survivors after operation and that of the survivors of non-operative treatment, meet. From this time on the fate of those who did not have surgical treatment is sealed. Their curve falls steeply as compared with that of the other group.

The establishment of an artificial anus is discussed in connection with various circumstances. The author uses a belt of autopneumatic rubber with a window of special construction for the anus as a closure apparatus for the artificial anus. Electrocoagulation of the tumor followed by roentgen and radium irradiation, or chordotomy, or else resection of the hypogastric plexus for relief of pain may have to be considered.

The author finally recommends his combined procedure, an attack of the condition from above by the abdominal route and from below by the sacral route at the same operation, which can be carried out best by two operators working at the same time. He uses spinal anesthesia with the most extreme elevation of the pelvis on a special operating table. Geleke succeeded in lowering the operative mortality to 6 per cent with his combined two-stage procedure which he described at the Surgical Congress in 1936. The author describes his own technique minutely, and the advantages of the synchronous operative procedure in one sitting are explained.

(KORITZINSKY) FLORENCE A. CARPENTER

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Uebelhoer, R : The Hepatorenal Disturbance (Die hepatorenale Störung). *Wien klin Wchnschr*, 1937, 1: 115, 155

From the reports of recent years hepatorenal disturbance appears to be more frequent than has previously been assumed. In the material of the Surgical Clinic No. 2 there are 166 cases of external bile fistula, internal anastomoses, and difficult opening of the choledochus, of which only the more severe

are given consideration. Of the 166 patients 49 died, and of these 4 succumbed to hepatorenal insufficiency, 3 were anuric, and in 13 involvement of the kidney could be demonstrated. In this report the author wishes to present a résumé of what is already known and make a report of his own attempts to decrease the incidence of this postoperative disturbance. The disturbance of kidney function develops some time after the operation, from the sixth to the eighth day the condition of the patient becomes worse and uremia develops. The usual urinary tests do not tell us anything about the prognosis of the postoperative kidney involvement, it is more important to obtain an exact knowledge of the function of the kidney, in so far as this is still possible. Hepatorenal insufficiency is produced not only by operation, this condition is also reported in the literature of internal medicine. Attempts to produce hepatorenal insufficiency experimentally have not afforded definite results, severe injury to the liver tends rather to produce disease conditions, such as are frequently seen following operation on the bile passages. The interrelationships between the liver and kidney as an organ of excretion are discussed exhaustively, and the author's own studies on the excretion of urea and chlorides are reported. As an analogy to the sudden releasing of the urinary-retention pressure, there has been proposed a theory of a reaction to decompression due to the sudden release of the congestion of bile, however, there is a difference between the polyuria following release of urinary stasis and the cholorrhea following relief of the biliary congestion. The persistent polyuria following the operative production of a fistula or the placing of a catheter is always a good sign, but one cannot expect a favorable outcome from a cholorrhea of the aforementioned type. The anuria following gall-bladder operations may result from a lowering of the blood pressure or loss of fluid or, of course, it may be the result of poisoning of the kidney by products of decomposition. The operation or the narcosis, in the various forms of surgical icterus, may lead to danger only if an alteration of metabolism, similar to that caused by operation and narcosis themselves, is already present. Much is to be attained by dispensing with the narcosis, by treating the tissues as conservatively as possible and by choosing the least extensive operation possible. According to Clairmont, if hepatorenal insufficiency is already present any operative procedure is prohibited. The nature of the damage to the liver and the capacity of the kidney must be determined. Of value in this regard are a determination of the residual nitrogen and its ratio with regard to the other nitrogen values, and the Millon test of the urine. The Vollhard water-capacity test should be done in every case. Of course, these tests give only the condition at the time, and in doubtful cases it is better to repeat them and venture upon the operation only when the patient is found to be in a stage of improvement or at least not getting any worse. There is no particular therapy for the disturbance of the liver

and kidney once it has become established. As a diureticum, urea should not be forgotten.

(SALZER) JOHN W. BRENNAN M.D.

Probst J. G. and Eckert C. T. The Injection of Ether into the Biliary Tract as Treatment for Cholelithiasis. *Arch Surg*, 1937 35 158

The frequent occurrence of stones in the common duct together with the difficulty of making certain that they are entirely removed by surgical means is discussed. A large series of experiments on dogs was conducted to determine the dangers and therapeutic value of the injection of ether into the biliary tract as a solvent for overlooked stones in the common duct as suggested by Pribram. The authors found a rapid decline of the dogs immediately after the beginning of the injections of ether together with a sudden decrease in the total output of bile. Jaundice developed in 3. The essential pathological changes in the extrahepatic biliary tract and the larger bile ducts in the liver were those of necrosis and sloughing of the epithelial lining.

The authors conclude that a thin layer of calcium so frequently present around stones will prevent the ready solution of the stones by ether. They recommend a thorough surgical removal of stones in the common duct followed by the injection of inert iodized oil not only for visualizing the biliary tract but in some instances for the relief of obstruction.

ROBERT ZOLLINGER M.D.

Meranze D. R., Salzmann H. A. and Meranze T. Surgical Disease of the Gall Bladder. Clinical and Pathological Review of the Disease in 133 Patients Operated on at the Mount Sinai Hospital with Follow Up Studies. *Arch Surg* 1937 35 87

The authors present a review of 133 cases of gall bladder disease which were operated on between the years 1930 and 1935. They were able to obtain follow up information on 83 of the patients.

The authors conclude that a clinical history of biliary colic and to a lesser extent of qualitative dyspepsia for fried and fatty foods and of jaundice is of primary importance in the establishment of a diagnosis of disease of the biliary tract. Cholecystography is the most valuable clinical test. It was correct in 82.7 per cent of 58 cases in which it was used.

The results of cholecystectomy on patients with non-calculous cholecystitis were better when the patients presented a definite history of biliary colic and a definite pathological process was found at operation. Cholecystectomy on patients with non-calculous cholecystitis in whom the pathological process was minimal and the clinical history of biliary colic was not definite resulted in relief of symptoms in only 56 per cent of the cases as compared to cure or great improvement in 67 per cent of the cases which gave a definite history of biliary colic.

Of the patients with calculous cholecystitis 98.4 per cent and of the non-calculous group 63.2 per cent were cured or improved clinically.

One death in 22 cases of acute cholecystitis operated upon as soon as the patient had been adequately prepared led the authors to state that surgery is preferable to conservative management in such cases. Both the morbidity and the mortality in the cases of acute cholecystitis were less after cholecystectomy than after cholecystostomy.

The authors state that the significant part which pericholecystic complications played in the death of 9 patients justifies early operative intervention after a definite diagnosis of cholecystitis has once been established.

EARL O. LATTIMER M.D.

Brocq P. and Varangot J. The Pathogenesis of So Called Pancreatic Hemorrhagic Lesions. Infarct or Acute Necrosis of the Pancreas (A propos de la pathogenie des lésions dites pancréatiques hémorragiques infarctus du pancréas ou nécrose aigue du pancréas). *Mém Acad de chir* Par 1937 63 947

The authors discuss seven new cases of acute hemorrhagic pancreatitis. In five of the cases biopsies were taken at operation and in two specimens were obtained at post mortem.

The specimens obtained at autopsy often showed that other visceral lesions had occurred simultaneously such as lesions of the liver, kidney, spleen, suprarenals but not of the lung as Reilly found.

The type of person most likely to be affected with acute hemorrhagic pancreatitis is the young adult who is rather obese, a heavy eater and drinker and possibly suffering from syphilis, diabetes or lithiasis.

Many different lesions are said to cause acute hemorrhagic pancreatitis, namely trauma, infectious, emphysema in the canal of Wirsung, and arterial venous or nervous lesions.

Experimentally a careful laboratory worker is able to produce the histological picture of acute necrosis of the pancreas by mechanical, vascular, anaphylactic, or nervous means. The authors injected a suspension of zinc in glycerine into the small vessels of the pancreas. They also reproduced human lesions in the dog by injecting bile in the canal of Wirsung upon completion of a full meal. Upon injection of a liquid such as horse serum or saline solution in the pancreatic veins of the dog not previously sensitized and operated upon during digestion and under general anesthesia there were more or less marked necrotic lesions found in the pancreas due to simple trauma. The intravenous injection of liquids breaks the smaller vessels and produces microscopic trauma. As the pancreas is extremely friable during the period of digestion histological damage is readily caused by gentle manipulation alone at that time.

Other observations made during experimentation were the possibility of vaccination of animals against active trypsin as trypsin is activated alone by kumase from necrotic tissue of any origin. The fact that

hypochloremia is present during the period of shock, and that insulinotherapy may give some important results

The authors report that they are not able to give any definite contribution to science from their experiments on this subject. Experiments in dogs differ from findings in man because of such integral factors as age, obesity, diet, diabetes, and syphilis.

The authors recommend the use of the following methods of treatment: (1) adrenalin or ephedrine to counteract shock and local congestion, (2) atropine to diminish the pancreatic secretion and reflexes, and (3) lavage of the stomach to help neutralize the acid chyme which generates secretine.

The high mortality of acute hemorrhagic pancreatitis is well known. In cases of an acute condition of the abdomen the question often arises whether or not operation should be performed even though the diagnosis of acute pancreatic necrosis is made. Cholecystostomy in particular has been found to ameliorate the condition. The authors believe that the possibility of a ruptured ulcer and acute appendicitis must be considered and therefore immediate laparotomy is justified.

RICHARD J. BENNETT, JR., M.D.

MISCELLANEOUS

McWhorter, G. L.: Subphrenic Abscess: An Original Extrapleural Operation. *Arch Surg*, 1937, 35, 241.

The author reviews the anatomy of the subphrenic space with consideration of the common causes of subphrenic abscess. He reports his experiences in the surgical treatment of 9 cases in which there was 1 death. The subphrenic abscess usually followed a recent acute attack of appendicitis, cholecystitis, or perforated ulcer. On the average eight days elapsed between the acute attack and the onset of symptoms from the subphrenic abscess. The temperature was rarely over 102° F with an average white count of 18,900 before drainage.

Various methods of drainage of a subphrenic abscess, depending on its location and size, are presented. The author discusses the well established methods of drainage, with an illustration of the original method as applied to 1 case. In his method, after resection of the rib in the axillary line, the costal and diaphragmatic pleural layers are incised and the edges are dissected laterally and sutured. A narrow strip of gauze impregnated with petrolatum is securely sutured over the U-shaped suture line. This affords an extrapleural diaphragmatic area about 3 cm long and 1.5 cm wide, which is entirely

satisfactory for drainage of the underlying abscess.

The author emphasizes that complications can often be avoided by early drainage with a method most suitable to the location and size of the abscess.

ROBERT ZOLLINGER, M.D.

Wicke, J.: The Use of Filtered Ultraviolet Light During Laparotomies (Ueber die Anwendung des gefilterten Ultraviolettlichtes bei Laparotomien). *Beitr z klin Chir*, 1937, 165, 630.

The favorable experiences with the use of filtered ultraviolet light during laparotomy in the first 85 cases of 1933 led to the further use of this procedure in 398 cases. The first group of cases included 71 cases of general suppurative peritonitis, 45 of which were the result of perforative appendicitis. The others were perforations of the gall bladder, the stomach, and of the common bile duct from cancer of the rectum. The second group includes 206 cases of acute inflammation of organs lying within the abdominal cavity with more or less marked, but always circumscribed, inflammatory involvement of their serosa and of the neighboring organs, such as perityphlitic abscess, phlegmonous or subacute appendicitis, incarcerated hernias, and acute pancreatitis. The third group consisted of 110 cases of chronic inflammation of the peritoneum or of the abdominal viscera, such as chronic appendicitis and cholecystitis. The fourth group were 11 cases of experimental irradiation of cancers of the abdominal organs, including one joint, and the wound areas of various operations.

The first group showed the most marked effects of the laparophos lamp. Only 20 per cent of the patients died, and of those with inflammation of the appendix and peritoneum only 16 per cent. In these cases the Clinic did not follow strictly the principles of Havlicek. Except in 4 cases they always drained the abdominal cavity with drain and gauze, and operated not only under local, but often under general anesthesia. They irradiated an exposed coil of small intestine placed on a moist compress, peritoneum, or the operative area itself, with the use of the Helluvio filters for from 5 to 25 minutes. With this technique, hyperemia and occasionally even peristalsis appeared.

The favorable signs after the operation were: (1) diminution of the pains, (2) early appearance of peristalsis, (3) disappearance of the peritonitic symptoms, (4) increase of blood pressure, and (5) general well being. The absence of adhesions, and the diminution of peritonitic adhesions and exudates could be demonstrated at relaparotomies.

(FRANZ) LOUIS NEUWELT, M.D.

GYNECOLOGY

UTERUS

Faucot H and Guilhem, P. The Treatment of Cervical Carcinoma During Pregnancy (Traitement du cancer du col de l'utérus pendant la gestation) *Rev franç de gynéc et d'obst* 1937 32 575

The coexistence of carcinoma of the cervix and pregnancy provides therapeutic problems of great complexity. The rarity of this occurrence makes for a very limited experience. Moreover the choice of therapy which involves a decision either to sacrifice the child in the interests of the mother or compromise the mother for the benefit of the child, is an unhappy one to make.

The authors review the history of cervical cancer in association with pregnancy. Briefly it parallels the history of cancer of the non pregnant uterus from the time of surgical treatment alone to the present era of irradiation or irradiation plus operation. Questionnaires returned from an international list of gynecologists reported 69 such occurrences which were treated by one of the several methods: surgery alone 25 irradiation alone 37 irradiation plus surgery 7. From the results obtained the authors draw conclusions as to the proper mode of treatment of this difficult condition.

Before the seventh month of gestation there are practically no chances of cure if attempts are made to safeguard the fetus after the seventh month attempts to save the child while justifiable compromise the life of the mother. The choice of treatment is difficult to make. Differing circumstances such as early or late pregnancy, labor and puerperium will of necessity determine the choice made.

In early pregnancy the chances of preserving the fetus with irradiation therapy are practically negligible; moreover proper irradiation therapy in the presence of the ovum is impossible. Hence if the lesion is operable the authors advise radical hysterectomy. Therapeutic abortion is considered as dangerous as delivery at term. In inoperable carcinoma the decision is even more difficult to make. The results are bad whatever the method employed. If the child is considered non viable supravaginal hysterectomy followed by irradiation may be advised. After the fifth month when the danger of radium to the fetus is considered less radium may be applied to the surface of the lesion as a temporary measure pending more active therapy following delivery. If abortion begins immediate hysterectomy is advised.

In late pregnancy i.e. after the seventh month the viable fetus deserves more consideration. Induction of labor is advised against. Three choices then remain: (1) cesarean section followed by the Wertheim operation; (2) cesarean section plus subtotal hysterectomy followed by irradiation; (3) radium to the cervix followed by cesarean section, subtotal hysterectomy, and postoperative irradiation. The

authors prefer the latter since it is more in harmony with the general anti-cancer campaign for the earliest possible treatment.

If the cancer is recognized for the first time during labor cesarean section is immediately advised. This is to be followed by immediate subtotal hysterectomy and postoperative irradiation. Vaginal delivery is extremely hazardous. Radical hysterectomy is impossible because of the extreme vascularity. If the cancer is discovered immediately after delivery or in the puerperium immediate hysterectomy is again advised. The same procedure applies to incomplete abortion namely, immediate hysterectomy without an attempt to evacuate the uterus. If the cancer is recognized after complete abortion the standard treatment by irradiation alone is indicated.

The authors conclude by emphasizing that irradiation alone is useless during pregnancy. The combined method offers the greatest chances of cure.

HAROLD C. MACK M.D.

Funkh Brentano P. The Surgical Treatment of Carcinoma of the Body of the Uterus (Le traitement chirurgical du cancer du corps utérin) *Gynécologie* 1937 35 397

Funkh Brentano states that there are three methods of surgical removal of the uterus: supra-vaginal hysterectomy, vaginal hysterectomy, and total abdominal hysterectomy.

From a general point of view it is necessary to know the extent of the lesion in patients with a carcinoma of the body of the uterus. It should be determined as nearly as possible whether the lesion has extended beyond the uterine borders and it should be remembered that a carcinomatous uterus is extremely friable. During surgical intervention the septic uterine contents should be prevented from spilling into the peritoneal cavity.

Supravaginal hysterectomy has been practically abandoned. The following are the main objections to it: a highly dangerous cervical stump is left behind, septic material may infect the peritoneal cavity, and it interferes with vaginal drainage.

Vaginal hysterectomy is theoretically an ideal operation in older women because as a rule it is not followed by surgical shock. The main objection is that patients affected with carcinoma of the body of the uterus are usually elderly and consequently the vagina is atrophic, sclerotic and rigid. A great amount of traction is usually necessary and this procedure is dangerous in view of the great friability of the uterus and the surrounding tissues. With this method furthermore the surgeon is unable to form an idea about the extent of the entire lesion. The operation is usually indicated in older women in whom an abdominal approach would be dangerous.

In the author's opinion the operation of choice is a total abdominal hysterectomy. The drainage is

usually satisfactory and there is no danger of tearing the organ by undue traction. Statistically it has been shown that most patients with a carcinoma of the body of the uterus are past fifty years of age.

Concerning the anesthetic to be used, the author believes that in cases of circulatory disturbance spinal anesthesia with scurocaine should be employed. If the arterial pressure is low, however, cyclopropane is the anesthetic of choice. Pre-operatively the vagina should be scrubbed and painted with iodine.

A median suprapubic incision is made. This incision is more advisable than a Pfannenstiel incision, after exposure of the organ the hysterectomy is carried out in the usual way.

The author agrees with Bisch that the mortality of total hysterectomy for carcinoma of the uterus is about 10.6 per cent. Bisch observed a complete recovery following the operation in 65 per cent of the cases, a figure which Funck-Brentano believes is too high, because most of the patients are relatively old and often die of an intercurrent condition. In the author's experience the immediate postoperative mortality is about 10 per cent and depends primarily upon the resistance of the patient.

RICHARD F. SOMMA, M.D.

Schinz, H. R.: Are the Surgical Results in Carcinoma of the Cervix Improved by Postoperative Irradiation? (Werden die operativen Resultate durch Nachbestrahlung beim Carcinoma colli uteri verbessert?) *Strahlentherapie*, 1936, 57: 393.

The author has gathered statistics on operable carcinoma of the cervix. The statistics of Warnekros, Philipp, from 1920 to 1922 and from 1923 to 1925, Abramsky, Zacherl and Lundwall, Kamniker, Pfeleiderer, Schmitt, Simon and Friedl are utilized. The purpose was to determine whether better results are obtained by operation plus postoperative irradiation than by operation alone. The statistics include 822 patients treated by operation alone. Three hundred and thirty-seven of these presented five-year cures. This is a successful result in 41 ± 1.7 per cent. The range of variation was from 39.3 to 42.7 per cent. Eight hundred and seven patients were operated upon and received postoperative irradiation, 446 (55.3 ± 1.8 per cent) of these presented five-year cures. The variation here was from 53.5 to 57.1 per cent. The difference in favor of postoperative irradiation was 14.3 per cent, the mean error being 2.5 per cent. The difference was a real one, for it was greater than three times the mean error.

The improvement of results from postoperative irradiation was a minimum of 7 per cent, beyond all possibilities of chance. Even when the statistics of Warnekros and Abramsky were not included, since these statistics were subject to possible question, there was still a decided improvement shown by the figures representing operation plus irradiation. The difference of the figures in favor of postoperative irradiation then becomes 9.4 per cent and the mean

error is 2.9 per cent. The difference is more than three times the mean error and therefore is real.

Even when the gathered statistics were drawn up empirically and the real scattering of the single statistics and the total statistics were determined, there was an undoubted superiority in the results from operation plus irradiation to those of operation alone.

(SCHAEFER) HAROLD C. MACK, M.D.

Schroeder, R.: The Treatment of Carcinoma of the Cervix from October 1st, 1922 to December 31st, 1930 (Die Therapie des Carcinoma colli uteri 1. X 1922—31. XII, 1930) *Zentralbl. f. Gynaek.*, 1937, P. 546.

This detailed report on the treatment of cervical carcinoma at the Kiel University Women's Clinic comprises a material of 604 cases, which are divided into 6 groups according to their location and extent. The first part of the work consists of a statistical recording of the cases thus grouped, showing for each group the different methods of treatment and their results, the ages of the patients, and the time when recurrence appeared. The second part of the work summarizes the results. The average percentage of operability was 58, it varied between 66 and 53. The cases operated upon averaged, however, only 50 per cent, from 65 to 45 per cent.

In the first five years of the period covered by the report the preferred operation was Wertheim's, which was performed in 178 cases, in the last three years it was Schauta's which was performed in 124 cases. With the former the primary mortality was 18 per cent, with the latter, 12.5 per cent, this gives a total mortality of 12 per cent for the 302 cases treated with both operative methods. A five-year cure was obtained in 43 per cent of these 302 cases, in 36 per cent of the cases operated upon according to Wertheim, and in 51 per cent of the cases operated upon according to Schauta. Permanent cure was obtained in 40 per cent of the operable cases treated with radium, plus roentgen irradiation of the parametrial tissues in some cases, and in 10 per cent of the inoperable cases, excluding the incurable. The primary mortality was 0.5 per cent for the first group, and 8.5 per cent for the second group. The total material of 604 cases contained 47 incurable cases, which were not subjected to treatment of any kind. The absolute percentage of cure for the entire material was, therefore, 28 per cent. The article contains much valuable information, for which the reader is referred to the original.

(F. SIEGERT) FLORENCE A. CARPENTER

ADNEXAL AND PERIUTERINE CONDITIONS

Bailey, K. V.: The Operation of Extroversion of the Ovaries for Functional Amenorrhea, Especially of the Secondary Type. *J. Obst. & Gynaec. Brit. Emp.*, 1937, 44: 637.

The author presents a report of the clinical results of treatment by surgery and by a minor degree of hormone therapy for secondary or functional amen-

orrhoea. He has treated 17 cases during the last six years. He considers that in these the cause of the amenorrhoea was probably primarily ovarian or secondary to inadequacy of the governing pituitary hormones. Assuming that in such patients the amenorrhoea was due to the absence of ovulation, the author presumed that a pathological change had occurred in the ovaries as the result of a basic pituitary hormone deficiency, leading to secondary cessation of function. The lack of follicular ripening and ovulation seems to contribute to the development of multicystic disease of the ovaries or to chronic cirrhosis of the tunica with progressive fibrosis of the ovarian stroma. In typical cases of this class of amenorrhoea these conditions can be diagnosed by clinical examination. It was this fact which led the author to believe that ovulation was prevented by the pathological changes resultant upon the hormone insufficiency, a type of vicious circle.

In the multicystic disease of the ovaries the whole of the periphery of the cortex becomes involved by multiple cystic distensions which penetrate down into the deeper zones toward the hilum. The normal contour of the ovary is lost and becomes enlarged and wedge-shaped with its base at the distal periphery. The more mature follicles are destroyed, probably intrinsically or by pressure obliteration, and the younger more deeply situated ones are prevented from approaching the peripheral surface to mature and ovulate. In chronic cirrhosis of the tunica the ovaries become smaller and harder owing to the fibrous and hyaline changes in the tunica and in the tissue of the stroma. In these cases ovulation is impossible and complete obliteration of even the deeply situated follicles is probable.

The operation of extroversion of the ovaries is based upon the foregoing facts and is an attempt to assist maturity and ovulation in the remaining follicles by facilitating their approach to the surface. In the operation a wedge having its base at the periphery is excised sagittally from the cystic ovary. The apex of the wedge is carried down to the region of the hilum. In this way the ovary is reduced in size by the removal of grossly cystic and functionless tissue and inversion of the cut edges is prevented. For the latter reason also a thin wedge is similarly excised from the cirrhotic ovary. Sutures of catgut are so placed in these cut surfaces as to turn the ovary partially inside out.

A broad raw surface is produced and left in the pelvic cavity but in none of the cases have there been postoperative complications. In conjunction with the operation small doses of Anutinrin S have been given in some cases.

In this series of cases 13 patients began regular menstruation immediately following the operation. There were 4 failures. There were 3 patients who were treated by modern endocrine therapy previous to the operation with no results. There are patients who are now menstruating regularly from every four to five weeks with normal loss of blood who were

previously suffering from either persistent relative amenorrhoea of the three to six months type or definite secondary amenorrhoea varying from one to three years duration. One patient had an amenorrhoea of two years duration at operation there was no trace of a corpus luteum in either ovary. Regular menstruation occurred five weeks after operation and continued at regular intervals of from four to five weeks for two years until the advent of the present pregnancy. The pregnancy was not terminated at the time of the report by the author.

HEBERT F. THURSTON, M.D.

Daniel C. and Babès A. Granulosa Cell Tumor of the Ovary (Tumeur à cellules de la granulosa de l'ovaire). *Gynécologie* 1937 36 321.

Following the first description of granulosa cell tumors the number of these tumors in the literature has increased to about 250. Nevertheless both the clinical and pathological characteristics remain in completely understood.

There seem to be two general types which the author terms 'folliculogenic' and 'non-folliculogenic'. The former is benign, the latter either benign or malignant. Both are composed of small cells which are poor in cytoplasm, indefinite in outline and which resemble the granulosa cells of the graafian follicle. One is unable to go much beyond this in formulating a classification.

Endocrine activity as reflected by endometrial hyperplasia is inconstant. It was absent in the 5 cases observed by the author.

The authors give a case history of a patient thirty-one years old whose principal symptoms were fever, ascites and bilateral ovarian tumors. A panhysterectomy was performed. The tumors were the size of a head and a fist respectively. Both were solid except for one cyst due to liquefaction necrosis. Surfaces made by sectioning had a marbled aspect. Histologically they consisted of small cells slightly larger than a lymphocyte, having little cytoplasm and ill defined cell outlines. These cells occurred in large masses and in cords which were separated by a scanty stroma. The nuclei were generally uniform in size but in some areas were polymorphous. The uterus was small and the endometrium definitely atrophic.

ALBERT F. DE GROAT, M.D.

Lazarescu S. Five Cases of Ovarian Seminoma Observed in Roumania (Cinci cazuri de seminom ovarien observate în România). *Gynécologie* 1937 36 356.

The author summarizes the 5 cases of ovarian seminoma that have thus far appeared in the Roumanian literature. The general features of the cases are the following:

The ages of the patients were respectively sixteen, seventeen, twenty-four, twenty-four, and forty years. Evidence of endocrine disturbance was limited to the menstrual function. There was first menorrhagia and later, as the tumors progressed, amenorrhoea.

The tumors were large, weighing from 2,100 to 4,030 gm. In 1 case both ovaries were involved. Except for occasional pseudocysts due to liquefaction necrosis, the tumors were solid. The external surface was always smooth, a thick fibrous capsule surrounding the growth. Surfaces made by sectioning were gray, usually mottled by yellow necrotic, and brown hemorrhagic areas.

Microscopically the tumors consisted of large cells, uniform in size, with pale vacuolated cytoplasm. The cell borders were rather ill-defined. The nuclei were large and more solid than vesicular. They showed only a few mitotic figures. Judging from the accompanying photomicrographs the tumors had the appearance of embryonal carcinomas of the testis.

The diagnosis of seminoma is based on embryological considerations. Hoche (*Thesis of Nancy*, 1929) states that in the formative stage of the genital gland there are two types of cells, one large and the other small. If the former develops, the gland evolves into the testis, if the latter, the gland becomes an ovary. It is believed that rests of the large cells give rise to the ovarian seminomas.

ALBERT F. DE GROAT, M.D.

EXTERNAL GENITALIA

André, C. P.: The Treatment of Vesicovaginal Fistula (*Traitement des fistules vésico-vaginales*) *Gynec et obst.*, 1937, 36: 114

The two principal causes of vesicovaginal fistula are dystocia and operations upon the uterus, especially total hysterectomy. Fistulas due to prolonged pressure on the bladder by the fetal head are becoming less frequent as obstetrical methods improve. During certain forceps procedures the vesicovaginal wall may be pinched and torn, leaving large fistulas, but this too is becoming less common. Cases of fistula due to abscesses remaining for many years have been reported. A more frequent cause of fistula is operative procedure on the uterus, in particular hysterectomy for cervical cancer. Occasionally the surgeon may notice the fistula at operation and suture it, but the sutures rupture and incontinence develops immediately following operation. In other cases the denuded vesical wall undergoes necrosis, in which case incontinence may develop a few days after operation. Fistulas have also been produced by the application of radium to cervical cancer in advanced cases in which the vesicovaginal wall is infiltrated by the tumor, and the rays meant to destroy the tumor perforate the bladder. Also neglected cervical cancer without irradiation may invade the vesicovaginal wall and perforate the bladder. The latter type is usually hopeless and therefore of little interest surgically.

There is rarely more than one fistula, occasionally there are two or three. The failure to detect multiple fistulas may be the cause of failure of treatment. The operator should always make a thorough search to be sure that none has been overlooked. If there

are two or three it may be better to unite them into one for repair.

The fistulas vary in size from those with a tiny lumen permitting escape of only tiny amounts of urine to large fistulas from 4 to 5 cm in diameter. Those of medium size, from 1 to 2 cm in diameter, are most common. The very large fistulas, with almost complete disappearance of the vesicovaginal wall and herniation of the bladder into the vagina are very difficult, sometimes impossible, to repair. The fistulas are usually located fairly high up on the anterior vaginal wall. The obstetrical fistulas generally open a little above the bladder neck in the region of the trigonum and the interureteral zone or a little above. Surgical fistulas following hysterectomy occur a little higher up at the base of the vagina, and open into the anterior cul-de-sac if the cervix has been preserved, or at the level of the vaginal cicatrix in total hysterectomy. Of course, the location determines accessibility for repair. The fistula may be median or lateral. The surgical fistulas are often located at one end of the transverse cicatrix of the hysterectomy wound. If lateral, the fistula may be dangerously near a ureteral orifice which may be injured during operation or included in the sutures. The same is true if the fistulas are large and the ureteral orifices are near the margin of the fistula. In such cases very special precaution is required to avoid injury to the ureters. The vaginal walls about the fistula may be supple or indurated, and the vagina constricted by sclerotic bands, thus rendering repair difficult. It is better to have a large fistula with supple walls than a small fistula with a constricted vagina with cicatricial and sclerotic walls. Before operating most surgeons dilate the vagina either by means of dilators or tampons of vaseline gauze or collargol. If the vaginal mucosa is inflamed, it may be necessary to irrigate it with disinfectant solutions. The bladder is nearly always infected and has to be disinfected by irrigation or the instillation of silver nitrate before operation. Irritation or ulceration of the labia majora, perineum, or inner surfaces of the thighs may require treatment before operation can be undertaken.

Regarding the time for operation, it is best to wait two months after injury before the operation is attempted, and if the operation proves unsuccessful, another two months should elapse before a second operation is undertaken. In cases of fistula following the attempted removal of cervical cancer, it is best to wait six months before operation is performed to make sure that there is no recurrence of the tumor.

For many years the vaginal route was the only method of approach, it sufficed, as the high fistulas following hysterectomy seen today were unknown in the days before this operation came into use. At present, gynecologists still make use of it, whereas urologists prefer the high transvesical route. Each has its respective advantages. In some cases in which the vaginal route proved unsuccessful a cure was obtained by the transvesical route and *vice versa*. Among the various procedures used the author de-

scribes briefly the technique of division of the fistula Braquehay's procedure Marion's technique and the transperitoneovesical operation of Legueu. He discusses the value of certain combined methods as well as the various positions recommended for the patient during the operation, the types of suture and the respective results. He emphasizes the fact that the vaginal route has great advantages for the low fistulas of obstetrical origin. If the vagina is too narrow and sclerotic a vulvovaginal debridement according to Chaput and Schauta may be done and careful suture made after the fistula has been closed. If a successful closure has not been effected after one or two interventions by this route it is best to resort to the superior route.

Following Marion's precedent many surgeons abroad adopted the transvesical route with excellent results even in patients who had been operated upon unsuccessfully by one or more other methods. Rarely was further operation required. Vollet reported a series of 66 cases with 63 cures (96 per cent). However the advocates of the vaginal method affirm that they frequently find the latter successful where the transvesical route has failed. The procedures should be considered as complementary as each has its advantages. The vaginal route is indicated in patients with low obstetrical fistulas who have a wide supple vagina and in obese patients, whereas the suprapubic intervention is preferable in cases of high fistula whether obstetrical or surgical. The superior route is indicated in all cases of narrow vagina whether in very young girls or due to sclerosis and contraction. In the transvesical operation there may be danger of injury to adherent intestinal loops either by the cutting or by inclusion in sutures the latter in one case led to subsequent intestovaginal fistula and required laparotomy. If such adhesions are suspected the peritoneum should be opened to ascertain the true state and if adhesions are present they may be liberated and the operation continued by the transperitoneovesical route. If no adhesions are found the peritoneum may be closed and the operation continued by the transvesical route.

In very small fistulas some authors have obtained good results by electrocoagulation of the vesical and vaginal orifices with insertion of a permanent catheter for about twelve days.

In vesicocervicovaginal fistulas the transvesical route is indicated. Many special procedures have been devised for treatment of the low vesicocervicourethral fistula. These are briefly described and preference is given to the two stage procedure of Marion. In very large fistulas the Germans have recommended interposition of the cervix or body of the uterus. In irreparable fistulas or those which have resisted several operative procedures colposcissus or urinary derivation by implantation of the ureters into the intestine have been recommended. The two latter operations are somewhat of a makeshift and often dangerous. The author prefers the double cutaneous iliac ureterostomy of Papin to the

intestinal derivation of Coffey because it is less serious and offers the patient a long survival.

EDITH CHANCELLI MORE

MISCELLANEOUS

Macchiarulo O. Anatomicofunctional Modification of the Urinary Bladder Ureters and Kidneys Following Subacute and Chronic Infections of the Uterus Adnexa and the Parametrium (*Le modificazioni anatomico funzionali indotte dalle affezioni infiammatorie subacute e croniche dell'utero degli annessi e dei parametri sulla vescica, gli ureteri ed i reni*). *Folia demograph gynec* 1937 34 153

The anatomicofunctional correlation of the genitalia with the entire urinary system has been observed under normal and pathological conditions by many clinicians. These two systems are so intimately associated that the most simple functional or anatomical alteration of one can seriously affect the anatomy and function of the other. The inflammatory processes of the female genitalia can in the various phases of their evolution so seriously affect the bladder, ureter and kidney as to greatly diminish the function and completely destroy the identity of these organs.

Lasio in a series of 250 cases of cystitis encountered in a period of fifteen years found that 27 had occurred in females many of whom suffered from chronic utero adnexitis.

The author gives a detailed report together with roentgenographs cystoscopic findings and case studies coming under his personal observation to illustrate the effect of the various pathological conditions of the genitalia upon the function and the anatomy of the bladder ureters and kidneys.

In the first 14 cases presented puerperal parametritis and chronic adnexitis accounted for cystitis hemorrhage cystitis dilatation and vesical atony and anatomical bladder deformity in every instance. The deformity was caused by compression or external cicatrization and the infections were caused either by direct extension or by means of the lymphatic or hematogenous systems.

In 2 additional cases tubo-ovarian inflammatory disease was followed by ulcerations of the bladder with calcareous deposits in the membrane of the lining.

The rarity of the rupture of tubo-ovarian abscess into the urinary bladder was emphasized by the incidence of 5 ruptures in 818 cases reported by Acs of Budapest, and 10 cases of rupture collected over a period of ten years at the Urological Session at Milan. Of the latter the author reviews 4 cases. There was some uncertainty as to the offending organism in these accidents but the gonococcus tubercle bacillus bacillus coli and streptococcus were all recovered from the lesions.

Many cases of ureteral stenosis have been shown to follow subacute and chronic pelvic disease and the author described 3 illustrative cases in detail.

Ureteral kinks were also frequently demonstrable, both experimentally and clinically, following this disease. Seven cases together with their respective roentgenpyelogram were presented. Five cases of ureteral dilatation, were also described as being a result of genital inflammatory processes, although the hormonal influence could not be completely excluded. Pyelitis and pyelonephrosis, with a frequency of 3 to 1 in the female as compared to the male, gave strong evidence that predisposition to this disease is a factor. Ten cases were described. Finally, detailed reports of 3 patients with perinephritic abscesses following tubo-ovarian infection demonstrated clearly the far-reaching effect that the pathological changes in the genital organs may have upon the function and anatomy of the entire urinary tract.

GEORGE C. FINOLA, M.D.

Ottó, J.: The Value of Short-Wave Diathermy Treatments in the Therapy of Inflammations in the Small Pelvis (Der Wert der Kurzwellenbehandlung in der Therapie der Entzündungen im kleinen Becken). *Arch f Gynaek* 1937, 163 633.

The author briefly discusses the physical characteristics of the short-wave and its general biological effects. The Gynecological Clinic of Budapest has been using the short-wave for the past two years in the treatment of inflammations in the small pelvis. They have been using both the tube-apparatus (Siemens-Ultratherm) and the spark-gap apparatus (Brevix-System, Varga).

In compliance with Schliephake's directions for securing a homogeneous distribution of warmth and avoiding a too intense surface-effect between the electrode and the skin, an electrode-skin distance of from 2 to 6 cm. was selected and the interval filled in by felt pads. A treatment was given every second day, the individual treatment lasting at first for ten, then fifteen, and later twenty minutes, in some instances it was even extended to thirty minutes. As a rule a course consisted of 15 treatments. So far a total of 174 patients were given short-wave treatments, 74 with acute or subacute, and 100 with chronic inflammation. The author gives tables which group the material into individual disease-forms with results in each form, and then gives subdivisions according to the state of the disease at the time of the treatments.

The results of treatment for the material as a whole are as follows:

Twenty-eight per cent of the patients were cured, 54 per cent showed improvement in their condition, approximately 5 per cent showed temporary improvement, and about 10 per cent showed no change.

Of importance were 3 cases in which an acute flare-up of a chronic process was observed. Two patients became worse under the treatments so that they had to be operated upon, this result was of interest and clinical importance. Both patients had a salpingitis tuberculosa.

The author closes with the conclusion that short-wave therapy is a scientific advance in treatment.

Among other advantages which it offers is the fact that, in contradistinction to ordinary diathermy, not only chronic, but also acute cases can be treated with beneficial results.

(KIRCHHOFF) JOHN W. BRENNAN, M.D.

De Aquino Salles, A.: Endometriosis (Endometriose). *Ann brasil de gynec*, 1937, 2 10.

Salles gives a general review of endometriosis with numerous original photomicrographs and references to the literature. He believes that both clinical observations and experimental studies appear to confirm Sampson's theory of implantation and dissemination. He discusses the recent work on endometrial grafts and advises their use, according to Fuchs's technique, on cervical stumps after supravaginal hysterectomy. Mention is made of 2 cases in which successful results were obtained with the use of endometrial grafts by the Brazilian surgeons, Bittencourt and Barata, who used the space below the vesico-uterine peritoneum. The graft was placed in contact with the fundus of the anterior vaginal wall.

The article contains French and German résumés.

M. E. MORSE, M.D.

Cattell, R. B.: Endometriosis of the Colon and Rectum with Intestinal Obstruction. *New England, J Med*, 1937, 217 9.

As the symptomatology of cancer and of endometriosis of the large intestine may be similar, it is very important to be able to differentiate them, preferably before, but certainly at operation. It is only thus that one can avoid, in cases of endometrial implants of the colon and the rectum, the more radical resections that are essential when dealing with malignancy.

In a series of 104 patients with endometriosis, who have been treated at the Lahey Clinic, 17 had involvement of the sigmoid, colon, or rectum (16.3 per cent), while 4 showed endometriosis of the appendix. Of the 17, 5 had involvement of the recto-vaginal septum and in 2 of these definite obstruction of the bowel was present. Eight had endometriosis involving the rectosigmoid and rectum, all with some degree of obstruction. The sigmoid was primarily involved in 4 patients, 2 of whom had almost complete intestinal obstruction.

The diagnosis is seldom made pre-operatively, but this condition should be suspected when the obstruction is of long standing and worse at the time of menstruation, when there are associated pelvic findings, and when the local lesion, on examination by the sigmoidoscope and barium enema, is not typical of carcinoma of the colon or rectum.

Radical treatment is necessary in most of the patients having involvement of the colon and rectum. Irrespective of the age of the patient, the operation should include removal of both ovaries. It is only rarely necessary to resect the bowel.

In patients with rectovaginal involvement, a biopsy to establish the diagnosis should precede

the abdominal operation. If the involvement is extensive and is producing a severe obstruction a bilateral oophorectomy is indicated with or without colostomy. Colostomy, if done is temporary and can be closed after a few months.

The treatment of the cases with involvement of the rectosigmoid and rectum due to extensive endometriosis in the pelvis is radical as far as the uterus, tubes and ovaries are concerned. It is advisable to remove the endometrial cysts encroaching on the lumen of the bowel as well as the ovaries, although the dissection of the cyst on the bowel is likely to be tedious and time consuming if injury to the intestine is to be avoided.

The treatment of discrete implants involving all of the layers of the sigmoid is a more interesting and difficult problem owing to their infrequent occurrence and their similarity to carcinoma. In the presence of intestinal obstruction that is not severe it seems safe to remove the ovaries without resecting the bowel if the diagnosis of endometriosis is confirmed by frozen section. Resection should be carried out in patients in whom carcinoma cannot be excluded. If the diagnosis is not certain and resection is performed and if examination of the resected specimen shows that the lesion is an endometrial implant the ovaries should be removed.

There has been no operative or subsequent mortality among the 17 patients with intestinal involvement.

Six cases are reported illustrating the different types of endometriosis of the sigmoid and rectum.

CHARLES BARON, M.D.

Pemberton, F. A. Endometrioma of the Female Genital Organs. *New England J. Med.* 1937 317:1.

At the Boston Free Hospital for Women 370 cases of endometrioma have been treated. In all cases the diagnosis was made by pathological microscopic examination. Two hundred and forty one patients (66 per cent) had radical treatment and 129 (34 per cent) had conservative treatment. Radical treatment means a hysterectomy and bilateral salpingo-oophorectomy while conservative treatment means the preservation of the uterus and some ovarian tissue or the use of radium or the x rays. There was 1 death which was caused by embolism after a supravaginal hysterectomy. Of the radical operations 222 (92 per cent) were supravaginal and 19 (8 per cent) were complete hysterectomies.

The anatomical distributions were varied in the conservative operations. They were as follows: single ovary 83, both ovaries 14, uterus 14, tubes 8, broad ligament 4, round ligament 2, posterior cul-de-sac 3, anterior cul-de-sac 1, rectovaginal septum 1, femoral hernia sac 2, appendix 1, abdominal scar 3, cervix 3 and vagina 4.

Of 107 patients with follow up studies 38 (39 per cent) needed further treatment. Thirty five were treated again. Nineteen required treatment within two years of the first operation. A radical

secondary operation was done on 24. Another conservative operation on 4 and x-ray or radium irradiation was used on 7. It is good practice to use the x rays for secondary treatment if the chief symptom is flowing and if any pain comes with menstruation but not under other circumstances. The author is cautious in the use of radium in these secondary treatments because the intestine may be adherent to the uterus, especially if a myomectomy was performed at the first operation and it may be devitalized by radium placed inside of the uterus.

Of 35 cases operated upon a second time 11 (31 per cent) showed no evidence of endometriosis at the second operation. The reasons for operation being fibroid, menorrhagia, adhesions and pelvic inflammation. The first 3 conditions however are frequently found with endometrioma and can be prevented by radical treatment at the first operation. One good reason for doing conservative operations is to relieve the sterility that commonly accompanies this disease. If the patient is in the child bearing age it is fair to try a conservative operation. If pregnancy is not a factor in the decision between radical and conservative treatment it is better to lean toward the former because of the high percentage of failures from the latter. If the conservative operation is a failure the patient stands an even chance of requiring another major operation within two years. Indications for conservative treatment must be strong and clear in order to justify it.

It is good practice to treat some of the recurrences with the x rays. A hysterectomy is always done if the ovaries are removed, otherwise the uterus becomes a useless organ potentially dangerous if there is a raw area on it to which other organs may adhere and because cancer may develop in it at any time. The added risk of removing it is not so great as the potential danger of leaving it. A suspension of the uterus is always the final step in the conservative method. It is done to prevent an adherent retroversion and to lift the ovaries out of the bottom of the pelvis where they might become fixed.

When endometrioma recurs after a conservative operation it is accompanied by the usual symptoms chiefly dysmenorrhea. In order to avoid the pain a presacral neurectomy is performed at the time of the conservative operation. This is done as the first step in the treatment. The peritoneal incision is covered with gauze and then the pelvic dissection is undertaken.

CHARLES BARON, M.D.

Holtermann, C. Skin Metastases of Carcinomas of the Genital Tract and Their Treatment. (*Hautmetastasen bei Genitalcarcinomen und ihre Behandlung*). *Fischer's J. Geburtsh. u. Gynaek.* 1937 134:320.

Recently a marked increase in the occurrence of skin metastases of carcinomas of the genital tract has been noted just as other authors have seen an increase of metastases in other organs. This increase

is connected with the longer survival of women with cancer and also with a more strict organization of follow-up services, which brings a larger proportion of skin metastases to the attention of the clinics. True skin metastases of carcinomas of the genital tract must fulfil the following criteria (1) they must actually take origin from a genital carcinoma, (2) they must show the same histological structure as the mother tumor, and (3) they must, by discontinuous growth, have become lodged primarily in the intracutaneous or the subcutaneous fatty tissue. Lymph-gland metastases, peritoneal metastases which have grown through the umbilical ring, and vaginal metastases are not included. Skin metastases can develop from cancer cells borne by the vascular route or from cells implanted in the course of the operation. The most frequent are the skin metastases of the external genital region which develop from cells which have arrived by the vascular route. Distant metastases of the skin and implantation metastases in the skin scar are rare.

The author reports 6 personal observations of metastases originating by way of the vascular route. Treatment consisted in surgical removal and irradiation with radium buried in the operative scars. The prognosis was more favorable than in any other kind of carcinoma metastases. In 5 cases hematogenous or lymphogenous metastases of the skin outside the genital organs were observed. In suitable cases local surgical treatment was given. The prognosis was good only as long as operation was still possible, which is not often the case. In cases of inoperable local distant metastases in the skin, radium and roentgen rays should be used in combination. In 2 cases implantation metastases in the operation scar or puncture tracks of the skin were observed. One of these cases was treated surgically, the other by radiotherapy.

The prognosis of implantation metastases in Schuchardt's incision is unfavorable. In general, the prognosis of skin metastases of carcinomas of the genital organs after operative or radium treatment is better than would be assumed from a perusal of the literature. (FRANKL) FLORINCE A. CARPENTER

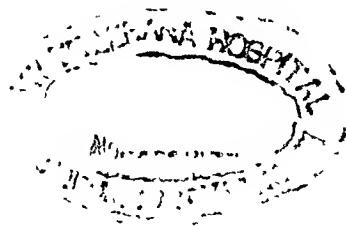
Plate, W.. The Results in the Treatment of Malignant Tumors of the Female Sexual Organs, in the Gynecological Clinic of the University at Amsterdam in the Years 1923 up to and including 1931. *J. Obst & Gynaec Brit Emp*, 1937, 44 737

During the years from 1923 to 1931, inclusive, 545 patients with malignant tumors of the female genitalia were treated in the Gynecological Clinic of the University of Amsterdam. Only those patients who were well after a period of five years were considered cured, those whose whereabouts were unknown were regarded as deceased. Absolute recovery was reported in 32.8 per cent of all patients with malignant tumors of the female genitalia, and 179 of the 545 patients were still in good health after a period of from five to six years.

In this series of cases, the prognosis for cure in carcinoma of the body of the uterus was 36.3 per cent and in carcinoma of the cervix, 32.8 per cent. The principal method of treatment consisted of radium and x-ray irradiation, and the best results were obtained in Groups I and II, which showed a cure of 43.8 per cent.

Patients with ovarian carcinoma, who were usually treated by operation followed by x-ray therapy, showed a low recovery rate of 15.8 per cent. Of 64 patients with involvement of other areas, such as the tubes, vulva, and vagina, only 15 were cured. There were 5 cases of carcinoma of the tube, with 1 recovery.

HARRY W. FINE, M.D.



OBSTETRICS

THE CONTRACTED PELVIS

Collective Review

J BAY JACOBS, MD, FACS, Washington, D C

MANY of the factors responsible for maternal and infant mortality and morbidity are preventable. Those associated with the abnormal pelvis are highly governable. Abnormalities encountered in the structure and contour of the fetus as a passenger are not nearly as serious or as common as those found in the maternal pelvis. Unfortunately, there are very few obstetricians who study the female pelvis scientifically. In recent years, the idea of affording the mother comfort during labor and permitting the patient or family to take part in directing the clinical course of labor has diverted the attention and efficiency of many good obstetricians from the important mechanical aspect of the specialty.

Because of Williams' statement that the incidence of contracted pelvis varies in different countries and in parts of the same country, MacLennan (34) made a study of the frequency of contracted pelvis in Scotland. Besides making many personal visits, he collected data from maternity hospitals and homes, clinics, and from other physicians. No standard method of procedure could be followed, the diagnosis having been made by external measurements in many cases, by internal measurements in a few, and in many by an interpretation of the labor record or delivery. Such methods of detection are by no means absolute although they yield a fair picture. Of the large cities of Scotland, Glasgow had the greatest number (8.2 per cent at the Royal Maternity Hospital), in the hospital cases of Dundee there were 4.43 per cent, in hospital cases of Edinburgh 2.83 per cent, and in the Aberdeen hospitals 2.64 per cent. Variations existed in different areas of the same cities.

Thomson (53) measured the diagonal conjugate in 6,905 women. In 85.4 per cent it measured 5 in., in 3.2 per cent it measured over 5 in., in 10.1 per cent it was between 4.5 and 5 in., and in 1.1 per cent it was under 4.5 in. He took occasion to disagree with the many English authors of ob-

stetrical text books who stated this measurement as being between 4.5 and 4.75 in.

Peckham and Kuder (40), in a search through the records of all the patients delivered on the Obstetrical Service of the Johns Hopkins Hospital from its inception in 1896 to the end of 1931, found 422 cases classed as contracted pelvis.

Pieri (41) states that the funnel pelvis of moderate degree, which is present in over 4 per cent of all cases, is the most common abnormality in white women. Hanson (17, 18) also calls attention to the frequency of outlet contractions as well as contractions of the midpelvic plane.

MacLennan (34) found that when contracted pelvises were common, rickets was an associated factor. Menon (38) states that pelvic contraction of the pronounced type is hardly ever encountered in South India, because severe forms of rickets do not occur and osteomalacia is almost nonexistent. He encounters many cases of moderate contraction and regards them as the most difficult ones to deal with a fact which is universally recognized. Garrasi (14) reviewed the obstetrical case records in the University women's clinic in Modena and found that the percentage of contracted pelvis has diminished in recent years which he attributes to the diminishing frequency of rickets. Venkatagiri (54) enumerates many environmental and developmental factors responsible for disproportion, and lays stress upon the indiscriminate mixed breeding of disproportionate men and women. Believing that one should be familiar with the size of the average maternal pelvis and fetal skull in the province in which he is going to practice, he compares the interspinous, intercrural, and external conjugate diameters of the average South Indian woman with that of the average European woman. The native woman has a 1 in. shortening in every dimension. MacLennan (34) noted that the income and method of living were factors in contracted pelvis for the condition was more common in poor people and crowded areas. Occupational stress did not cause pelvic deformity in young females.

Von Chinski (15) diagnoses contracted pelvis by external pelvimetry and occasionally by internal

pelvimetry. An interspinal diameter of less than 26 cm and an external conjugate of less than 19 cm, or a conjugata vera of less than 10 cm, if measured, denotes a contracted pelvis. On this basis there were 12,669 contracted pelves in 27,203 deliveries at the Chemnitz clinic. The author's method of treatment and results will receive consideration in a subsequent part of this paper. Attention may be directed however, to the careless method of designating a contracted pelvis.

There is disparity not only in the method of measuring pelves in the various clinics of many countries, but also in the unit of measurement used. The centimeter is used by some and the inch by others. MacLennon (34) makes the worthy statement that pelvimetry of a uniform and effective character should be the universal procedure. Naturally the first step in this direction should be the acceptance of the centimeter as the universal unit of mensuration, because by modern methods of pelvimetry we are able to measure fractions of a centimeter, and the smallest difference in cephalic and pelvic measurements makes the greatest difference in any borderline case.

It is surprising to note some of the disparaging opinions that are held relative to pelvimetry. Smith (49) states that external pelvimetry is sometimes helpful, but its accuracy, depending as it does largely upon the personal factor and thickness of the soft parts, is a debatable point. She considers internal pelvimetry more accurate, provided it is performed under chloroform before the fetal head is fixed, and with a colleague present to check the figures obtained by making independent observations. Menon (38) states that external pelvimetry affords only a rough idea of the size or shape of the pelvis and that to his mind pelvimetry serves only as a compilation of statistics of disproportion. Brown (4) feels that no two observers will obtain the same measurements and that a single observer may note two different measurements of the same diameter in a patient. Purandare (43) thinks he has a solution to the problem of disproportion, he sorts out the cases according to cephalopelvic disproportion at the thirty-sixth week. He believes in the discarded idea that half of the intercrural diameter represents the length of the transverse diameter of the inlet. The latter diameter bears a relationship to the true conjugate in the flat pelvis, as stated by this author, in that it is a factor in determining the available area at the inlet. The flare of the iliac bones, which I (21) have referred to in the literature, is a variable factor. It is possible to measure the transverse diameter of the inlet very accurately by x-ray pelvimetry.

As to dystocias, it is surprising to note how many writers direct attention to factors other than pelvic contraction as the cause. Such items as mobility of the pelvic joints, uterine contractions, the fortitude of the patient, the age of the patient, the moldability of the fetal skull are in my opinion relative, while the size and inclination of the pelvis are absolute. Undue attention should not be directed to these less important factors as an excuse for ignorance of the application of the scientific methods of performing pelvimetry and cephalometry. In the review of the literature of the last five years on the subject of contracted pelvis, one is impressed with the apparent ignorance of most authors, of the value and applicability of roentgenographic pelvimetry, demonstrated either by reference to the roentgenogram as being merely a photograph, or in many instances, by no reference whatever to the subject. I shall subsequently stress the practical usefulness and simplicity of the technique of pelvimetric roentgenography. I shall also show the uselessness of the roentgenogram when not taken according to one of the standard techniques. Many authors unfortunately use the head as a pelvimeter. In certain cases where there has not been an opportunity for careful prenatal study, or in certain borderline cases, this may be indicated. However, I personally am opposed to the routine use of the head as a pelvimeter and dependence upon cephalopelvic disproportion as an excuse for not performing accurate pelvimetry, as is frequently the case. Cook (7) approves of the adage that the fetal head is the best pelvimeter. He also calls attention to "secondary" pelvic contraction which occurs from time to time in women who have previously given birth to a number of children without considerable difficulty. He states that it is due to a post-partum subluxation of the sacro-iliac joints resulting in a narrowing of the anteroposterior diameter of the pelvic brim. I cannot say that I have ever recognized secondary pelvic contraction.

Various authors have suggested certain classifications of contracted pelves. Brown (4) estimates the true conjugate from the diagonal, and divides his cases into three classes. (1) those with a conjugata vera of 3 75 in. or over, which should permit normal delivery, (2) borderline cases with a conjugata vera between 3 25 and 3 75 in., and (3) cases with a conjugata vera below 3 25 in., which indicates cesarean section.

MacLennon (34), using Litzman's standard, accepts a true conjugate of 9 5 cm. or less in a flat pelvis, or 10 cm. or less in a generally contracted pelvis as designating pelvic contraction.

Delmas and Battle (10) regard those cases with a true conjugate of from 11 to 9 cm as slight contractions, those with a true conjugate of from 9 to 7 cm as medium, and those with a true conjugate below 7 cm as extreme. Those below 5 cm are called absolutely contracted.

Rodecurt (45) advocates mensuration of the diagonal conjugate not only in every pregnant woman, but also in every woman coming for gynecological examination. Drawing conclusions from 1 case of dystocia which he reports, he states that a diagonal conjugate of 9.5 cm may be regarded as the borderline below which normal delivery is impossible. He subtracts 1.7 cm from the diagonal to obtain the true conjugate.

Puppel (42) advises general practitioners to hospitalize any woman with a true conjugate diameter of from 8 to 8.5 cm or less. I would raise these figures about 2 cm, justification for which will be shown presently.

Cook (7) approves of the estimation of the diagonal conjugate but believes that it should be reserved for special cases because it may produce pain and discomfort.

Peckham and Kuder (40), in discussing labor in contracted pelvis, wisely avoid confusion by regarding a pelvis as contracted if the diagonal conjugate measures 11.5 cm or less.

Dippel (12), in a recent comparison of the external, diagonal, and obstetrical conjugate diameters made in 115 normal and abnormal cases, concludes that the external conjugate is of no value in detecting anteroposterior contracture of the pelvic inlet because of the variation in thickness of the pelvic bones and because these two diameters do not lie in the same plane, a factor to which I (31) have called attention in criticizing the proficiency of methods of roentgenographic pelvimetry. He found a variation of from 4.93 to 13.5 cm between these two diameters, an observation worthy of notice. Of the external pelvic diameters, I consider the external conjugate the most important and do not agree with Dippel that it should be discarded because when considered along with the general build and stature of the patient and the thickness of her bones this diameter may afford a very good reason to suspect the possible presence of anteroposterior contraction. Another good reason for not discarding the external conjugate diameter is due to its practical use in the determination of pelvic inclination, a subject which warrants more discussion in this review. I believe that Dippel thinks that the external conjugate is no indication of the actual length of the obstetrical conjugate, and such opinion cannot be disputed. This

author also considers the value of the diagonal conjugate diameter as a possible indicator of the length of the obstetrical conjugate diameter and of course concludes that there is no definite relationship between the lengths of the two. This is an observation which I (22) have long recognized as warranting much discussion. Dippel measured the obstetrical conjugates by an accurate technique of roentgen pelvimetry, and it is interesting to note that in no case was there a diameter of less than 10 cm, showing that pelvises of marked contraction are not common. This conforms very much to my own experience, and it makes me wonder in what respect radical in obstetrics may be justified.

Schumann (48) impresses me with his practical views. He favors simple external pelvimetry with manual measurement of the diagonal conjugate through the vagina, for this procedure will at once disclose gross pelvic contraction and if the physician is in doubt, roentgenographic pelvimetry should settle the question.

Thoms (51) states that the external pelvic measurements mean but little to him. When he finds an external conjugate of 18 cm, he rightly thinks of the possibility of pelvic contraction. He favors the measurement of the diagonal conjugate as obtained manually, but for various reasons it is too often recorded as 'not reached'.

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Decision as to the methods of treatment based upon the length of the true conjugate as obtained by the commonly practised method of Smellie has, in my mind, been responsible for more confusion in treatment and caused more error in prediction of the prognosis in borderline and contracted pelvises than any other single factor. Smellie's procedure has value in measuring the length of the diagonal conjugate, but beyond this point its application in determining the length of the true conjugate diameter is dangerous.

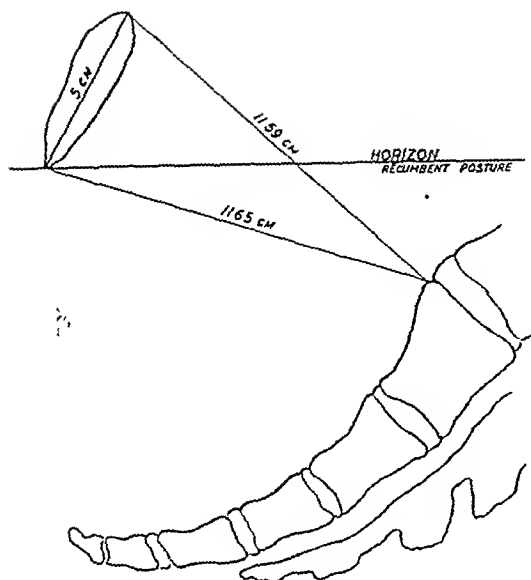


Fig 1 Pelvigram of the average pelvis in this series, with patient in recumbent posture. In the ordinary modified lithotomy position in which women are usually measured, all diameters are somewhat smaller.¹

In a series of 80 borderline cases, I (23) calculated the length of the true conjugate diameter with precision, using the obstetrical inclinometer, and checked these determinations by both anteroposterior and lateral pelvimetric roentgenography. In this series the average diagonal conjugate measured 11.65 cm (Figure 1). The average true conjugate was not from 1.5 to 2 cm smaller, but on the contrary, measured 11.59 cm. In only 8 per cent of the cases did Smellie's rule apply. In 89.5 per cent of the cases the difference between the true and diagonal conjugates was less than 1.5 cm, affording the patient a more favorable prognosis and warranting a suitable test of labor. Most women with borderline pelvises are delivered through the natural channel and usually spontaneously, because the true conjugate is larger than we have been accustomed to estimate. These facts justify conservative views in the consideration of borderline pelvises.

I (23) have differentiated between the true conjugate and the obstetrical conjugate, the latter being .7 cm smaller than the former. The term "available conjugate" is more expressive than "obstetrical conjugate." The factor of greatest importance in determining the length of the true conjugate from the diagonal is the obstetrical angle (27), which is included between the symphysis

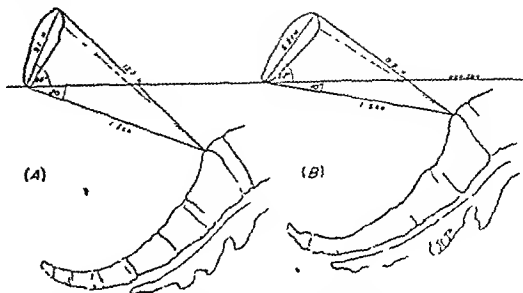


Fig 2 Two cases taken from the author's series, in which the diagonal conjugate diameters were equal, but there was a difference of 2.1 cm in the true conjugate diameters. Smellie's rule of deducting 1.5 to 2 cm from the diagonal, to obtain the true conjugate, is rarely applicable.²

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The smallest pelvis that I have ever encountered had a true conjugate of 8 cm. When a true conjugate actually measures 9 cm the prognosis for delivery of a normal sized infant is very poor. When this measurement is 8.5 cm or less the head of the full-term infant, in my opinion, will not enter because in such an instance the available conjugate measures 7.8 cm or less.

The accepted text-book classifications of normal pelvis, moderate contraction, and absolute contraction with designated procedure for treatment and prognosis based upon the record of results in each of the three classes must be discarded, because they are built upon false foundation as they have originated from the application of Smellie's rule, which has been shown to be misleading in 89.5 per cent of cases. Careful determinations of the true conjugate, such as may be made with the obstetrical inclinometer, or direct measurement of this diameter by an accurate technique of x-ray pelvimetry should eventually permit the establishment of a new set of figures designating the normal, the borderline, and the contracted groups of pelvises in a large series of borderline and contracted pelvises, and make it possible to state with more definite precision the indication as regards treatment, along with fairly reliable prognostication.

¹From *Am J Obst & Gynec.*, 1937, 33: 775.

²From *Am J Obst & Gynec.*, 1928, 15: 689.

Delmas and Battle (10) regard those cases with a true conjugate of from 11 to 9 cm as slight contractions, those with a true conjugate of from 9 to 7 cm as medium, and those with a true conjugate below 7 cm as extreme. Those below 5 cm are called absolutely contracted.

Rodecurt (45) advocates mensuration of the diagonal conjugate not only in every pregnant woman but also in every woman coming for gynecological examination. Drawing conclusions from 1 case of dystocia which he reports he states that a diagonal conjugate of 9.5 cm may be regarded as the borderline below which normal delivery is impossible. He subtracts 1.7 cm from the diagonal to obtain the true conjugate.

Puppel (42) advises general practitioners to hospitalize any woman with a true conjugate diameter of from 8 to 8.5 cm or less. I would raise these figures about 2 cm, justification for which will be shown presently.

Cook (7) approves of the estimation of the diagonal conjugate, but believes that it should be reserved for special cases because it may produce pain and discomfort.

Peckham and Kuder (40) in discussing labor in contracted pelvis wisely avoid confusion by regarding a pelvis as contracted if the diagonal conjugate measures 11.5 cm or less.

Dippel (12) in a recent comparison of the external, diagonal, and obstetrical conjugate diameters made in 115 normal and abnormal cases, concludes that the external conjugate is of no value in detecting anteroposterior contracture of the pelvic inlet because of the variation in thickness of the pelvic bones and because these two diameters do not lie in the same plane, a factor to which I (21) have called attention in criticizing the proficiency of methods of roentgenographic pelvimetry. He found a variation of from 4.9, to 13.5 cm between these two diameters, an observation worthy of notice. Of the external pelvic diameters I consider the external conjugate the most important and do not agree with Dippel that it should be discarded, because when considered along with the general build and stature of the patient and the thickness of her bones this diameter may afford a very good reason to suspect the possible presence of anteroposterior contraction. Another good reason for not discarding the external conjugate diameter is due to its practical use in the determination of pelvic inclination, a subject which warrants more discussion in this review. I believe that Dippel thinks that the external conjugate is no indication of the actual length of the obstetrical conjugate and such opinion cannot be disputed. This

author also considers the value of the diagonal conjugate diameter as a possible indicator of the length of the obstetrical conjugate diameter and of course concludes that there is no definite relationship between the lengths of the two. This is an observation which I (22) have long recognized as warranting much discussion. Dippel measured the obstetrical conjugates by an accurate technique of roentgen pelvimetry, and it is interesting to note that in no case was there a diameter of less than 10 cm, showing that pelvises of marked contraction are not common. This conforms very much to my own experience, and it makes me wonder in what respect radicalism in obstetrics may be justified.

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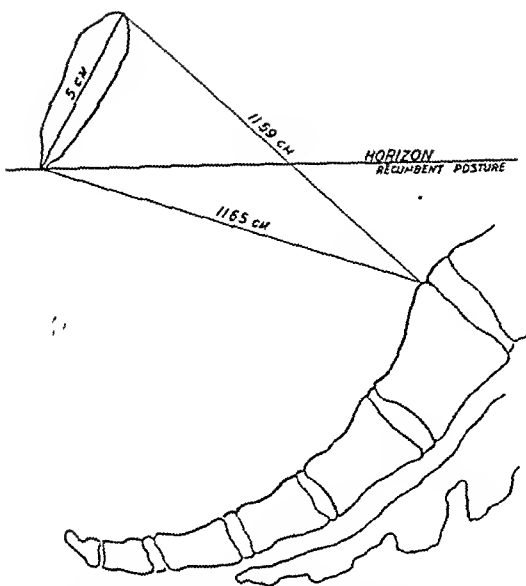


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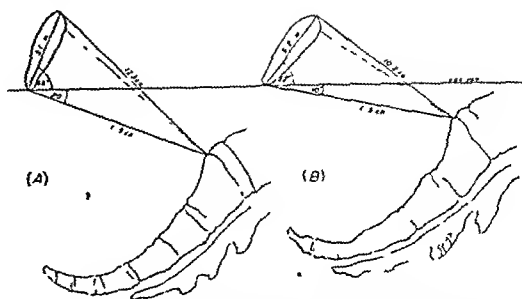


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¹From Am J Obst & Gynec, 1937, 33: 778

²From Am J Obst & Gynec, 1928, 15: 689

The greatest contributions to the solution of the problem of contracted pelvis have been the recent advances in the technique of roentgenographic pelvimetry. As previously stated, this does not imply the mere taking of a roentgenogram, for unless certain physical principles are followed, a picture may be very misleading and may be responsible for an unfortunate result. The obstetrician should know enough about the procedure to enable him to direct the roentgenologist, who usually is not familiar with obstetrical landmarks, diameters and planes.

Thoms (52), who has done pioneer work in roentgen pelvimetry, advocates the application of this method of mensuration to every primipara.

Dippel (12) believes that when the diagonal conjugate measurement is 11.5 cm. or less, the patient should be given the benefit of that precision in pelvimetry which only x-ray methods can yield.

It is customary in my clinics to obtain a lateral pelvimetric roentgenogram in all primiparas having a diagonal conjugate of 11.5 cm. or less, in all multiparas giving a history of dystocia due to bony obstruction, and in all multiparas with a diagonal conjugate of 11 cm. or less, regardless of a history of previous normal deliveries. The various purposes for which the roentgenogram may be of value in the study of borderline and contracted pelvis will receive consideration after discussion of its use in measuring the most important pelvic dimension, namely the conjugata vera.

The many advancements in the technique of pelvimetric roentgenography cannot be elaborated upon in a paper of this type. A description of the technique which measures the true conjugate in a simple manner and thus enables diagnosis and appraisal of contraction is, however, permissible.

In 1934 I (24) described a method of lateral roentgenography in which the patient was placed on her side in recumbent posture. Very recently Reichenmiller (44) described such a technique stating that he had used it successfully in approximately 350 cases in the course of nine years. I have abandoned this procedure because the pictures were not as clear as was anticipated and because symmetrical points in the pelvis were seldom properly superimposed. For the last two years I (25) have been using the standing posture with gratifying results.

The patient is secured with her side in contact with a vertical Bucky diaphragm containing the cassette and film which has been adjusted to the height where the film receives the desired image. The x-ray tube is placed so that its center ray will strike three fourths of an inch posterior to the an-

terior inferior iliac spine. This point usually designates the middle of the true conjugate diameter and lies in the same plane. After the exposure is made and before the patient is removed the distance from the genital crease (inlet or symphysis) to the film is noted, as well as the target-to-inlet distance. The lead grid with perforations 1 cm. apart throughout its surface, as first advocated by Thoms is then interposed between another film and the x-ray tube, in the relationship of distance formerly occupied by the patient's inlet and exposure is made. After both films are developed the one containing the dots which is the image of the perforated lead grid, is so superimposed on the film containing the image of the pelvis that a line of dots extends from the sacral promontory to the top of the symphysis. The number of dots which are included in that distance is the length of the true conjugate in centimeters.

Incidentally, a fairly accurate measurement of the presenting diameter of the fetal skull is obtained and disproportion in cephalic presentation is readily detected (Figure 3). It is desirable that the roentgenogram be taken during the last month of pregnancy for the reason just given. I agree with the statement of Guenot (16) that measurements of the fetal head can be made only if it is in contact with the superior strait. In breech presentation any estimate of cephalopelvic disproportion is precluded.

In recent years many men have come to recognize transverse contractions of the inlet. Although this condition is frequently responsible for the occurrence of the persistent occiputoposterior variety, it seldom is marked enough to prevent engagement. However, when the lateral roentgenogram does not show actual disproportion and the head is not engaged as anteroposterior roentgenogram should be taken, for only by this procedure can the length of the transverse diameter be measured. Most authors employ the semisitting posture of Thoms (52) in which the patient is positioned so that the inlet appears parallel to the film which is underneath the x-ray table. The tube is placed approximately over the middle of the inlet and exposure is made. Before the patient is removed from the table, the station of the pelvic inlet between the tube and film is determined. After the patient is removed the perforated lead grid is interposed at this same station, and a second exposure is made on the same film. It is evident that the dotted images of the perforations in the lead plate will be displaced to the same extent that the area of the inlet is enlarged on the film. Therefore the number of dots

that come to lie in the transverse diameter of the inlet will reveal its length

My own technique of anteroposterior roentgenography (25) is based upon similar principles, except that instead of positioning the patient, I place her in recumbent posture. With the aid of the inclinometer, I determine the inclination of the inlet and then position the film and tube at corresponding angles, so that the film is parallel to the inlet and the tube is directed perpendicular to both. My own modification of a lead grid as used by Thoms (52) is then employed to project the dots on the film.

Walton's (55) technique is similar to Thoms', except that for measuring distortion he uses a correction chart instead of the lead grid.

Ball (2) using an anteroposterior and lateral picture of the pelvis, has approached the problem of cephalopelvic disproportion in a unique manner. With his pelvcephalometer he determines the volume of the fetal skull in milliliters. He then determines the volume capacity of a sphere with a diameter equal to that of the true conjugate, as well as the volume capacity of a sphere having a diameter equal to the bi-ischial spine diameter. After making some allowance for the thickness of the scalp and moldability, he decides whether the skull volume is larger than the volume capacity of the spheres of the two pelvic diameters named, in which event disproportion would be suspected. Ball's work merits recognition and although I am in accord with many of his views, I (26) have already commented on certain probable disadvantages.

Johnson (28) has perfected the interesting technique of stereoroentgenometry. After taking stereoscopic views of the pelvis, he is able to localize any points in space with the use of his stereoroentgenometer. Thus, if the sacral promontory and upper border of the symphysis were located in space, the distance between them, as measured with a caliper, should be equal to the length of the true conjugate diameter. Johnson states that he can measure any diameter of the pelvis, or any diameter of the fetal skull.

Hodges' (19) work does not differ materially from that of Johnson, and he too is very precise in his technique. He seems to be principally interested in cephalometry. Using the graph of Scammon and Calkins (46), he estimates the age of the fetus, however, the margin between minimum and maximum age for any given cephalic diameter is rather large for certain measurements, which detracts from the usefulness of the procedure. Of course, his technique permits measurement of the true conjugate in the lateral view.



Fig 3 Lateral roentgenogram of patient at term, showing disproportion. True conjugate measures 11.4 cm. Available true conjugate measures 10.7 cm. Biparietal measures 12.8 cm. (This was a hydrocephalic monster, in which the biparietal diameter measured 12.8 cm at birth.)¹

Under the subject of contracted or borderline pelvis should be considered any type of pelvis that would offer obstruction to the passage of a fetus of normal size. In this regard, a brief review of the work of Caldwell, Moloy, and D'Esopo, as well as the observations of some other authors, is indicated.

Caldwell (5) and his associates have solved the problem of pelvic classification. This has been done in their usual scientific and understandable manner. They describe four parent types of pelvis (Figure 4), three of them having always been recognized by obstetricians, namely, the gynecoid or typical female pelvis, the android or male type, and the platypelloid or flat pelvis. The fourth is the anthropoid type, the pelvis with the oval inlet and the transverse contraction, which has been rediscovered, so to speak, during the last few years and has been attracting ample attention. Naturally, not every woman's pelvis would be a true type, and so these authors make it possible to describe any pelvis by adequate reference to

¹From Radiology, 1937, 28: 406

the combination of characteristics presented by the four parent types. Thus, as an example of mixed type we might quote the android type of pelvis with anthropoid tendency, meaning that the posterior segment conforms to the male type and the long narrow fore part gives the appearance of an anthropoid pelvis. Moloy (39) has devised a precision stereoscope with which he can view stereoscopic films of the pelvis, so that they may be properly classified and described and various measurements taken. By stereoscopic examination the authors have observed cases before during, and after labor. Their findings associated with known details of the labor and delivery as well as facts ascertained on vaginal examination have enabled them to describe what they consider the mechanism of engagement of the presenting part in the inlet of the various types of pelvis, as well as the mechanism throughout the lower levels of the pelvis. In each instance it may be stated that the procedure is largely one of mechanical adaptation of the presenting part to the passageway governed to some extent, of course by the forces of resistance as well as the forces of expulsion and their relationship to axes of pelvic planes.

Obstruction although most commonly observed at the inlet, may be encountered at the midpelvis or at the outlet. In this connection the size of the sacrospinous notch is important because, as Caldwell and Moloy (6) have shown, it is a definite indication of the posterior pelvic capacity. Since rotation occurs in the hollow of the sacrum, limitation of the pelvic capacity as demonstrated by a small sacrospinous notch or by the absence of normal sacral concavity would interfere with the normal mechanism of labor. Convergence of the pelvic side walls also interferes by preventing anterior rotation in the occipitoposterior varieties. In this connection Hanson (18) has found that when the midpelvis is contracted the incidence of forceps delivery is about seven times as great as when no such contraction exists. Such pelvis he states resist rotation and forceps traction. Besides taking up much room in a contracted midpelvis the forceps cause deflection and potential enlargement of the head. A biparietal diameter of 9 cm. or less is believed to cause insuperable resistance to forceps traction.

Outlet contraction is more easily detected than midpelvic contraction. Pieri (41) considers the average outlet as having a transverse diameter of 10 cm., a posterior sagittal diameter of 7.5 cm. and an anteroposterior diameter of 11 cm.

Schuman (47) calls to our attention a new pelvic diameter namely the pubotuberous diameter,

which gives the depth of the pelvis and aids of course, in the detection of deep or funnel pelvis.

Hanson (17) believes that the use of the outlet forceps in funnel pelvis is fraught with danger for the infant, because the obstruction encountered in these cases is usually due, not to pre-existent disproportion but to disproportion resulting from deflection incident to forceps traction.

Recently Garnett and I (13) have called attention to faulty inclination as a cause of dystocia inherent in the bony pelvis even though the measurements may be normal. The clinical importance of this condition first attracted Garnett's attention. Similar recognition has since been afforded it by many obstetricians. Maltas (37) refers to disproportion due to an unusually high inclination of the inlet, and quotes his experience with 7 cases, such as were described by Garnett and Jacobs. I (13) have come to the conclusion that in the borderline pelvis the inclination of the inlet is 42° in recumbent posture and that the habitual inclination is 48° . Since the inclination in recumbent posture had been regarded as 30° , it is evident that the average pelvis has an inlet that presents itself more favorably to receive the forces of expulsion than has heretofore been believed. Just as the true conjugate diameter in the borderline pelvis is larger than we had believed it to be so also the inclination of the plane of the superior strait is more favorable than is generally assumed. For these reasons, patients with borderline pelvis usually deliver normally and should therefore be treated conservatively. A few practical methods of detecting inclination are worthy of mention.

(1) A lateral view of the patient as she stands will reveal an unusual lumbosacral angle. Besides presenting faulty inclination the protruding lumbar vertebrae may obstruct the entrance of the presenting part into the brim.

(2) With the patient standing, there is a difference in the level of the examiner's two index fingers when one is placed on the upper border of the symphysis and the other at the spine of the last lumbar vertebra.

(3) When measuring the external conjugate, the inclination or angulation of the pelvimeter should be noted.

(4) The lateral pelvic roentgenogram, especially when taken late in pregnancy, will show not only the inclination of the inlet in its relationship to the spinal column, but also the size of the sacrospinous notch, the presence or absence of the normal sacral concavity, the size of the head in relation to the pelvic inlet, and the ability to engage.

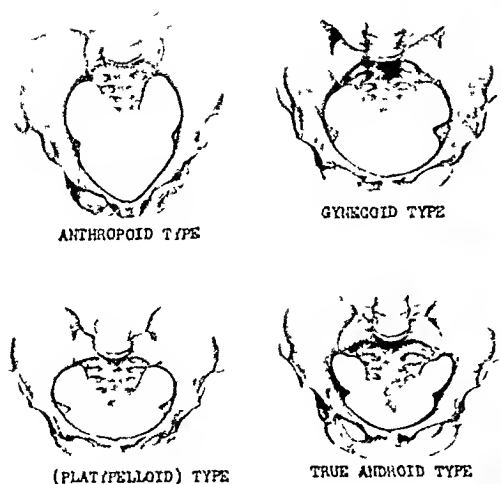


Fig 4 The four parent types of pelvis as described by Caldwell, Moloy and D'Esopo. Even a layman can detect the difference in the inlet contours. Since adaptation is an important factor in engagement and resulting mechanism, the shape of the inlet plays an important part. Most pelvises show a blending of types, and differences in contour may be detected only by the trained eye.¹

The abnormal pelvis associated with hunchback is discussed by Le Lorier (32). He states that the uterus has at its disposal a small abdomen, which may cause interference with cardiac action. I (24) have already mentioned the fact that the "availability" of the inlet may be affected in any lumbar lordosis. This author calls attention to the male type of outlet associated with this pelvis, and describes a barbaric method of measuring the transverse diameter by inserting the thumbs in the vagina and stretching the introitus so that the thumbs touch the ischial tuberosities. The distance between the thumbs is noted by an assistant. The views here presented seem to be based upon a very limited experience, for they are anything but scientific.

Kirchhoff (29) reports a case of spontaneous delivery from a spondylolisthetic pelvis, in which the conjugata vera was 10.2 cm, the baby weighed 3,900 gm. In the literature I (26) have shown that this is not an infrequent occurrence (Fig 5), and women with deformed pelvises, with or without abnormality of the spinal column, should receive careful pelvimetric study for the purpose of determining the pelvic capacity.

Methods of treatment of borderline and contracted pelvises are varied, and to a surprising degree according to geographical location.

¹From Radiology, 1937, 25:406

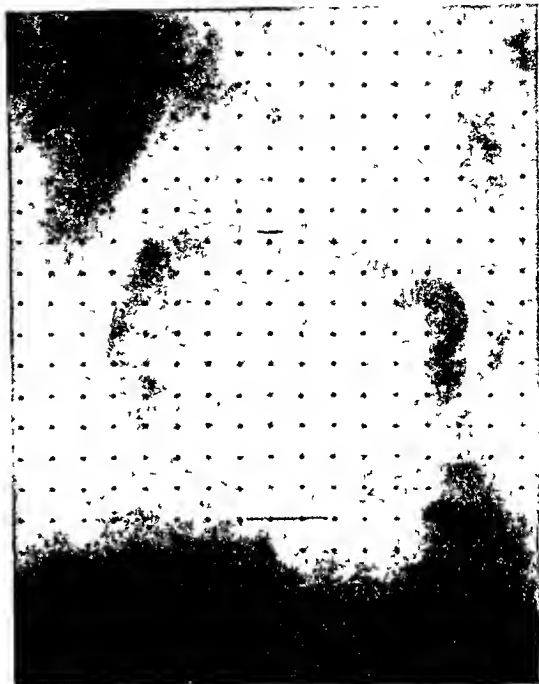


Fig 5 The plane of the superior strait in a patient that had had poliomyelitis in childhood. She is unable to walk and although this pelvis is unusually small, she has had two babies normally. Film was parallel to inlet, by author's technique. In an ordinary flat film, the contour of this inlet was overlooked. True conjugate is 9.3 cm. Length of true conjugate as calculated with author's inclinometer was 9.4 cm.¹

Under prophylactic procedures, enlargement of the pelvis by resection of the sacral promontory carried out in conjunction with another laparotomy is advocated by Magni (36). He states that this is permissible when the conjugate is not under 78 mm. In my opinion the pelvis would have to measure much over 78 mm in the anteroposterior, even before resection is done, if normal delivery is hoped for. When a true conjugate measures 9 or 10 cm and when the promontory is the only architectural obstruction, this may be feasible, but I doubt it.

Delageniere (8) reported 8 cases of permanent enlargement of the pelvis by means of osteoperiosteal grafts. A study of the cases showed that there was no static disorder after operation, and the gait remained normal. One of the patients was said to have become pregnant and had a spontaneous delivery after operation. To my mind, endorsement of this procedure is not justified.

MacLeod (35) described what he called "manual dilatation of pelvis" in which by brute force he enlarged the outlet so his hand could enter the pelvic cavity, following which he manually enlarged the rest of the pelvis. This instance is recorded for two reasons: first, because of the atrocious method of treatment in order to enlarge the pelvis and, second, to show the need for more careful scrutiny of material submitted to medical journals for publication.

De la Grande and Vegas (9) learned that restriction of the mother's diet in order to limit the birth weight of the infant was attended with injurious effect upon the infants in cases of contracted pelvis. Although their experience was very limited they concluded that the attempt was a failure.

Postural changes such as the Walcher position in the treatment of inlet contractions, have been shown by me (24) not to have much practical utility. However, when the pelvis is normal in size and the obstacle presented is a faulty inclination, postural changes during labor, such as sharp flexion of the knees on the abdomen will frequently make the inlet available to the forces of expulsion and result in engagement. Malpas (37) calls attention to the fact that Smellie, in 1766, advocated flexion of the thighs on the abdomen, as I did. He believes that if the parturient stands and leans over when having a pain the same effect is produced and in addition the uterus falls forward permitting its long axis to approach the axis of the plane of the superior strait.

Under active methods of treatment the advisability of premature induction should first be considered. Balard and Mahon (1) reviewed the ideas of different authors from the seventeenth century to the present time in this regard and concluded that in the present state of our surgical knowledge induced premature birth in contracted pelvis is not advantageous. Venkatagiri (54) states that the results of induction when done before thirty-six weeks of pregnancy are not favorable in hot Madras so far as the child is concerned it is difficult to raise a premature baby. The mother is usually ignorant of the duration of pregnancy.

Menon (38) believes that in handling the borderline case, prompt and correct judgment born of experience alone will make for the best results whatever the amount of theoretical knowledge one possesses. He considers trial labor more satisfactory than premature induction.

Venkatagiri (54) states that trial labor as demonstrated by the relative scarcity of cesarean sections at the Rotunda Hospital is an example

of disproportions becoming "less and less as the mental or "judgment" proportions become "more and more."

Brouha (3) is an advocate of test labor, having applied it to 351 borderline cases during the last eight years, 254 patients were delivered spontaneously and only 72 required cesarean section. The maternal death rate for the 351 cases was 1.7 per cent, and the infant death rate 6.8 per cent. Such excellent results show the value of conservatism.

Cook (7) argues that trial labor was in common practice at Guy's Hospital long before it was recommended elsewhere. He stresses the fact that the most unlikely heads enter the most unlikely pelvis without apparent difficulty. However it may be impossible to determine beforehand which of them will oblige and which will not. Nowadays with the available modern methods it is not fair to the baby to induce labor before the thirty-fifth week. Instead the author would prefer trial labor and section if necessary.

Telang (50) states that cases of trial labor are a source of great anxiety and should be under expert supervision from the start. I am in hearty accord with this view.

Guenot (16) favors test labor but in case of breech presentation when there is any doubt regarding the possibility of spontaneous delivery a cesarean section should be performed at the onset of labor. I rather favor this procedure although it would be less worrisome to me if external cephalic version could be performed, which would permit mensuration of the pelvis and skull by lateral roentgenography.

During test labor I have found Leopold's fourth maneuver to be of great value. The prominence of the scapula is easily elicited and its descent readily detected without the risk which attends numerous vaginal examinations.

Reichenmüller (44) calls attention to the danger of vaginal examinations in borderline cases and performs them only when the lateral roentgenogram fails to reveal the desired information.

An interesting remark is credited to Malpas (37). He states that because people have overlooked the inclination and shape of the pelvis, methods of pelvimetry have been discredited and out of this discredit the procedure of trial labor developed.

To my surprise, von Ghinski (15) and Puppel (42) favor the use of pituitrin in certain cases of contracted pelvis.

Hogler (20) in deep transverse arrest resulting from trial labor, favors the use of the Kielland forceps applied in the oblique diameter of the

head in order to avoid the promontory. He refers to pelves of slight contraction. I believe it is well to avoid oblique or anteroposterior compression of the fetal skull.

Guenot (16) favors the classical cesarean section when a test of labor is undesirable. He believes that a low cesarean will permit sufficient security even when performed late in the course of labor.

Cephalopelvic disproportion, according to Langrock (31), is the excuse for most of the unnecessary cesarean sections being done today. He warns that a head not engaged at the outset of labor in a primipara does not signify cephalopelvic disproportion.

Von Glinski (15) is outstanding in his radicalism in the treatment of contracted pelves. Using very meager means of detecting a contracted pelvis, he found 12,669 of them in 27,203 deliveries. He then performed 897 cesarean sections, which certainly is too many for any man to do in a lifetime. In his series he considered cesarean section indicated in 142 additional cases, but in these instances either the patient or her physician objected. The results in this series are by no means complimentary.

Schumann (48) states that when the diagnosis of insuperable obstruction is reached the ideal treatment is elective cesarean section before labor, before rupture of the membranes, and under local anesthesia. In the cases presenting bad risks because of exhaustion and infection, he chooses from three methods of delivery, namely, low cervical section, Latzko cesarean section, or embryotomy if the child is dead.

In the review of the literature many of the foreign authors refer to the use of pubiotomy and symphysiotomy. The indications of the latter procedure are well summed up by Desnoyers (11). He favors its use in disproportion between the fetal head and the pelvis, when the pelvis is not markedly contracted, when the pelvis is normal and the fetus large, in face and brow presentations, and in cases in which cesarean section appears dangerous to the mother because of unsuccessful instrumentation.

The conservative clinics report favorable results. Livchina (33) reviewed 13,000 deliveries and 15 per cent of these were in women with contracted pelves who were treated conservatively. In 91.5 per cent of all his cases there was spontaneous delivery with no maternal death, the reported infant mortality was 2.8 per cent. Surgical intervention was thought advisable in 8.5 per cent. In these cases the maternal mortality was 0.6 and the infant mortality 34.5 per cent.

Kuestner (30), in referring to 7,319 children born at the Leipzig Clinic, discusses only infant mortality. Eighty-one and four tenths per cent of the children were born normally with a mortality of 3.8 per cent, 1,556 children were delivered operatively, and among these the mortality was 16.2 per cent.

As would be expected, Peckham and Kuder (40) found that the fetal mortality varied directly with the weight of the child at birth. Garrasi (14) found that the more marked the pelvic contraction, the greater was the infant mortality in births by normal means.

Peckham and Kuder (40) observed that when the trial labor was less than thirty hours, the fetal mortality was only 7.19 per cent, but when over thirty hours, it reached 19.23 per cent. These authors state that although prolonged labor terminated by operative procedures from below entails less risk to the mother, the infant mortality is great enough to warrant the performance of cesarean section with the saving of more infant lives. In their series of 442 contracted pelves, only 4 maternal deaths could be attributed to obstetrical procedures. I consider their reported statistics as being good, and doubt if any other attitude could have improved them.

In conclusion, Brown's views (4), which are rather concise, warrant mention. He believes (1) that a patient who is delivered normally of a normal sized fetus may be expected to have normal deliveries in the future, (2) when section follows a trial labor, section should always be done in subsequent pregnancies, and (3) if trial labor is terminated by the use of forceps and a dead baby is delivered, premature induction of labor is indicated in future pregnancies.

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MacLeod (35) described what he called "manual dilatation of pelvis" in which by brute force he enlarged the outlet so his hand could enter the pelvic cavity, following which he "manually enlarged the rest of the pelvis." This instance is recorded for two reasons: first because of the atrocious method of treatment in order to enlarge the pelvis and, second, to show the need for more careful scrutiny of material submitted to medical journals for publication.

De la Crande and Vegas (9) learned that restriction of the mother's diet in order to limit the birth weight of the infant was attended with injurious effect upon the infants in cases of contracted pelvis. Although their experience was very limited, they concluded that the attempt was a failure.

Postural changes, such as the Walcher position in the treatment of inlet contractions, have been shown by me (24) not to have much practical utility. However, when the pelvis is normal in size and the obstacle presented is a faulty inclination, postural changes during labor, such as sharp flexion of the knees on the abdomen, will frequently make the inlet available to the forces of expulsion and result in engagement. Malpas (37) calls attention to the fact that Smellie, in 1766, advocated flexion of the thighs on the abdomen as I did. He believes that if the parturient stands and leans over when having a pain the same effect is produced and, in addition, the uterus falls forward permitting its long axis to approach the axis of the plane of the superior strait.

Under active methods of treatment the advisability of premature induction should first be considered. Ballard and Mahon (1) reviewed the ideas of different authors from the seventeenth century to the present time in this regard, and concluded that in the present state of our surgical knowledge, induced premature birth in contracted pelvis is not advantageous. Venkatagiri (54) states that the results of induction when done before thirty-six weeks of pregnancy are not favorable in hot Madras so far as the child is concerned, it is difficult to raise a premature baby. The mother is usually ignorant of the duration of pregnancy.

Menon (38) believes that in handling the borderline case, prompt and correct judgment born of experience alone, will make for the best results whatever the amount of theoretical knowledge one possesses. He considers trial labor more satisfactory than premature induction.

Venkatagiri (54) states that trial labor as demonstrated by the relative scarcity of cesarean sections at the Rotunda Hospital is an example

of disproportions becoming 'less and less' as the mental or "judgment" proportions become more and more.

Brouha (3) is an advocate of test labor having applied it to 351 borderline cases during the last eight years, 254 patients were delivered spontaneously and only 72 required cesarean section. The maternal death rate for the 351 cases was 1.7 per cent, and the infant death rate 6.8 per cent. Such excellent results show the value of conservatism.

Cook (7) argues that trial labor was in common practice at Guy's Hospital long before it was recommended elsewhere. He stresses the fact that the most unlikely heads enter the most unlikely pelvis without apparent difficulty. However, it may be impossible to determine beforehand which of them will oblige and which will not. Nowadays, with the available modern methods, it is not fair to the baby to induce labor before the thirty-fifth week. Instead, the author would prefer trial labor and section if necessary.

Telang (50) states that cases of trial labor are a source of great anxiety and should be under expert supervision from the start. I am in hearty accord with this view.

Guenot (16) favors test labor, but in case of breech presentation when there is any doubt regarding the possibility of spontaneous delivery a cesarean section should be performed at the onset of labor. I rather favor this procedure although it would be less worrisome to me if external cephalic version could be performed which would permit mensuration of the pelvis and skull by lateral roentgenography.

During test labor I have found Leopold's fourth maneuver to be of great value. The prominence of the sinciput is easily elicited and its descent readily detected without the risk which attend numerous vaginal examinations.

Reichenmüller (44) calls attention to the danger of vaginal examinations in borderline cases and performs them only when the lateral roentgenogram fails to reveal the desired information.

An interesting remark is credited to Malpas (37). He states that because people have overlooked the inclination and shape of the pelvic methods of pelvimetry have been discredited, and out of this discredit, the procedure of trial labor developed.

To my surprise von Glinski (15) and Puppel (42) favor the use of pituitrin in certain cases of contracted pelvis.

Hogler (20) in deep transverse arrest resulting from trial labor favors the use of the Kielland forceps applied in the oblique diameter of the



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Fig 1 Roentgenogram in a control the shadow of the fetal head rests upon that of the bladder.

Fig 2 Placenta previa centralis at term. Note distance between the bladder and the fetal head

Fig 3 Placenta previa marginalis, the bladder filling entirely on the right. On the left side is a distinct shadow of the placenta

duced dilute thorium salts into the uterine arteries of 2 human uteri at two months and three months, respectively, and were unable to demonstrate a placental shadow because the salts would penetrate only as deeply as the uterine musculature. Menees, Miller, and Hoy injected strontium iodide directly into the amniotic sac and were able to obtain a clear outline of the fetus as well as the location of the placenta. Potassium iodide, thorium salts, "abrodil", uroselecten, tetra-iodophenolphthalein, "umbrenal", and "piehofanin" have been substituted for strontium iodide by others with equally good results.

Ude, Weum, and Urner, in 1934, introduced a newer method of indirect placentography designed purposely to demonstrate the presence or absence of placenta previa. The method consists essentially of the instillation of 40 c cm. of 12 per cent sodium iodide into the urinary bladder followed by roentgenography. Substitution of air for sodium iodide has been unsatisfactory. Ude, Weum, and Urner in their radiographs of normal pregnancy, noted that the fetal head in cephalic presentation always rests upon the anterior inferior wall of the lower uterine segment just above the bladder. Anatomically the vesical wall has a thickness of several millimeters and is separated from the inferior segment of the uterus by the vesico-uterine peritoneal fold. The lower uterine segment, too, has a thin wall even at the third month of pregnancy. Thus the tissue interposed between the fetal head and the lumen of the bladder is approximately 1 cm., which on the roentgenogram appears as from 6 to 8 mm. The diagnosis of placenta previa by means of the roentgen rays then is based upon the existence of an increased space, from 6 to 8 cm., between the bladder and the fetal head. If the presenting part is the breech or the shoulder, the test is valueless.

In the work of the latter investigators, 35 women with bleeding in the last trimester were subjected to placentography. The diagnosis of placenta previa was made in 14 and was confirmed by cesarean section or post-partum examination. In the remaining 21, placenta previa was definitely ruled out and the hemorrhage was found to be due to partial premature separation of the placenta.

Rabecchi and Zocchi, using the same technique, were able to show, even after the third month of pregnancy, in primiparas as well as multiparas, in the presence of an engaged as well as an unengaged or floating head, that the fetal head is in direct proximity to the base of the bladder.

After a thorough study of all available roentgenograms of normal pregnancy, the author finds that the fetal head always rests upon the base of the bladder in spite of any anatomical change due to pregnancy, and that this relationship is even intensified by the onset of labor or the rupture of the membranes (Figure 1).

Using the technique of Ude and Urner the author reports 8 cases which were diagnosed as placenta previa and confirmed by cesarean section or post-partum examination in each instance. A ninth case in which placenta previa had been ruled out proved later to be a placenta previa lateralis situated on the posterior wall of the lower uterine segment. This case demonstrated one important objection to this method of diagnosis (Figure 2).

Several valuable contributions were made by the author as follows.

1 Placenta previa lateralis as well as marginalis, invariably shows a one-sided filling defect in the bladder shadow (Figure 3).

2 In 2 cases reported in this series, the placental outlines can be clearly seen without any contrast media having been introduced. It is thus possible

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PREGNANCY AND ITS COMPLICATIONS

Schuerger S *Cervical Pregnancy (Cervix Schwan gerschaft) Ortos* *heft* 1937 p 408

The same factors which operate in the formation of placenta previa can also bring about a cervical pregnancy. Such factors are increased ciliary motion in the endometrium, contractions of the uterus, decreased cytolytic hyperplasia of the fertilized ovum and endometritis interstitialis.

The seat of the implantation also depends upon the tempo of migration and implantation. Cervical pregnancy occurs usually in multiparas. The cervix hypertrophies, becomes spherical in outline and the body appears to be a tumor situated upon a sphere. The outcome is usually abortion or rupture of the cervix takes place with intraperitoneal bleeding. Sometimes the fetus and its coverings are forced into the uterus proper and may become implanted there. The pregnancy may then go to term.

The author reports a case in a thirty two year old para II with a positive pregnancy reaction. The cervix appeared as a soft fluctuating mass above which the corpus could be felt. The diagnosis was hematometra or cervical pregnancy. On account of the severe bleeding the cervix was dilated a fetus 5 cm long was delivered and the coverings were cleaned out digitally. Very severe hemorrhage occurred and on that account the cervix was amputated and mass ligatures were placed to control the hemorrhage. The hemorrhage arising from the

cervix and parametrial vessels in such cases is always very severe.

(FELIX GIL) LEO A JENKLE M D

Cetroni M *Placentography and the Radiological Diagnosis of Placenta previa (Placentografia e diagnosi radiologica di placenta previa)* *Clin ostet* 1937 39 373

In order to directly visualize the placenta by means of the x rays it is necessary to administer either orally or parenterally an opaque substance which will accumulate in that organ and make it more or less impervious to the roentgen rays. Among the many methods which have been employed both in animals and in man the external method of placentography or injection of a contrast medium directly into the cord vessels immediately after the expulsion of the fetus has given optimum results in studying the insertion of the placenta as well as the mechanism of separation and expulsion.

The therapeutic need for diagnosis of the insertion of the placenta during pregnancy has stimulated considerable research on this important subject. Intravenous injection of thorium salts for placentography has been used extensively in animal experimentation but the dose necessary often produced abortion or even death and in those animals that recovered there was found a high incidence of sterility. Attempts to apply these methods to man were entirely unsuccessful. Nizza and Stoppani intro



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Fig 1. Roentgenogram taken the day following the fracture



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Fig 2. Roentgenogram taken forty days after the fracture, callous formation is shown



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Fig 3. Roentgenogram taken seven months after delivery and nine months after the fracture showing restoration and complete reconstruction of the two pubic rami

excellent general condition when she left the clinic on the ninth post-partum day

One-half year later the patient reported that she was able to walk normally without any pain. The child was breast fed and developed normally. The last roentgenogram taken showed complete healing of the fracture, as seen in Figure 3.

In discussing the cause and pathogenesis of the condition the author points out the great difficulty in explaining the underlying cause of this accident. The differential diagnosis includes all those pathological conditions which lead to spontaneous fractures such as osteosarcoma, metastatic carcinoma, simple echinococcus cysts, syphilis of the bone, osteomyelitis, rickets, Lobstein's disease, Recklinghausen's disease, Paget's disease, locomotor ataxia, general paresis, progressive muscular atrophy, infantile paralysis, senile osteoporosis and osteopathies due to avitaminosis D, and especially osteomalacia. The latter condition is particularly apt to occur in association with pregnancy.

The author believes that in this case the fracture occurred as the result of circumscribed osteopathic processes limited to this part of the skeleton.

Bolaffi reviews briefly the very few cases of similar spontaneous fractures and discusses the problem of demineralization occurring during pregnancy and its possible relationship to this case. He also briefly outlines the various methods of treatment.

RICHARD E. SOMMA, M.D.

LABOR AND ITS COMPLICATIONS

Cavagnino, L.: A Clinical Study of Podalic Presentation (Studio clinico sul parto podalico) *Ginecologia*, Torino, 1937, 3: 550

At the Obstetrical Clinic of the Royal Maternity Hospital in Turin, Cavagnino reviewed 27,043 obstetrical cases during the period from 1926 to 1935. Among these were 887 cases of podalic presentation, an incidence of 3.2 per cent.

The total mortality of this type of presentation was found to be 17.3 per cent, but if cases of dead and macerated fetuses, premature separation of the

placenta, eclampsia, and malformations are excluded, the mortality decreases to 12.8 per cent.

During labor the mortality in the author's series was 3.5 per cent, and the same mortality rate was observed during the first seven days of life. The maternal mortality was found to be 1.1 per cent. In general, therefore, podalic presentations in this clinic took a favorable course for the mother and a fairly good course for the fetus.

From a prophylactic point of view, especially in England and in America, external version is performed during the last weeks of pregnancy. Objections, however, have been made based on the observation that following external version, occiput-posterior presentations have resulted with a considerably prolonged labor. In Italy this procedure is used only rarely. The author calls special attention to the frequent occurrence of transverse or oblique presentations and to the dangers which may arise from uterine malformations and premature separation of the placenta due to a short umbilical cord. Gibberd reports that in external version the fetal mortality is 2 per cent. It should also be considered that often the patient enters the hospital with a completely engaged fetal head or with the membranes already ruptured so that an external version cannot be performed.

In all cases of podalic presentation the author advises watchful expectancy. Rapid extraction should be avoided because it tends to favor anomalies of attitude of the upper extremities and the head of the fetus. The presenting part must have reached the perineum or the vulva before any traction is made.

At this hospital the fetus was always extracted according to the Levret-Mauriceau technique. The head was delivered with the aid of pressure on the uterine fundus. With a dead fetus or in cases in which the head could not be delivered, craniotomy was the method of choice in order to avoid injury to the maternal genitalia. The author, however, warns against the dangerous practice of using excessive fundal pressure in these cases because of the danger of fetal asphyxia.

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GEORGE C FINOLA M D

Couvelaire A and Couvelaire R The Pathogenesis of Utero Placental Apoplexy (Apoplexies utéro-placentaires Essai de pathogénie) *Gynéc et obst*, 1937 36 143

By the designation 'uteroplacental apoplexy' obstetricians of today signify certain acute cases of retroplacental hemorrhage with bloody infiltration of the genital apparatus but from a pathogenetic viewpoint the term is not justifiable. Under it have been grouped syndromes of similar pathogenesis whatever their location or degree: apoplexy limited to a placental cotyledon or a circumscribed area of the decidua recognizable only upon examination of the placenta after delivery; interuteroplacental apoplexy of no real danger to the mother; apoplexy involving the uterine walls and the whole genital region with severe clinical reactions and severe apoplexy involving simultaneously the liver, kidneys, stomach and nervous centers. Their common factor, whatever their site or extent is that they are caused not by hemorrhage but by apoplexy. The pathogenesis of these processes is far from clear. However from a study of clinical experimental and anatomical observations conclusions as to the mechanism of production should be possible, this might be a step toward a less empirical therapy.

Toward the end of the nineteenth century it was discovered that these apoplexies were associated with lesions of the decidua known as endometritis and consisting of foci of cellular necrobiosis, thromboses and leucocyte infiltrations in other words common changes seen in many placentas toward the end of pregnancy that gave no trouble whatsoever. It was noted moreover that the apoplexy occurred chiefly in multiparas over thirty years of age and was associated with albuminuria. Premature senility of the uterine mucosa due to multiple pregnancies, puerperal infection and the chemotoxic action of a preceding nephritis or hypothetical pregnancy toxemia were cited as causes. The determining cause of final rupture of the blood vessels was believed to be hypertension.

However such a theory could account for only a certain number of cases as in others no vascular lesions or preliminary hypertension could be demonstrated and further studies indicated that a bursting of the capillaries rather than of the blood vessels was responsible. A certain vascular predisposition was observed doubtless attributable to syphilis or some other hereditary taint.

By application of various poisons to the sympathetic system an attempt was made to demonstrate experimentally the probable releasing cause of these apoplexies. It was discovered that the best examples of uterine apoplexy were obtained in pregnant animals previously sensitized to various antigens. These findings suggested that uteroplacental apoplexy might belong in the category of visceral infarct

due to anaphylactic shock. By producing anaphylactic shock in guinea pigs by direct intraperitoneal injection of various substances Couvelaire was able to produce genital apoplexy in two-thirds of his animals, he later obtained similar results with intra-ovular injections of histamine into guinea pigs previously sensitized to histamine by intramuscular or intraperitoneal injections. Thus genital apoplexy can be produced in rabbits and guinea pigs either by way of the sympathetic nervous system which controls the vascular functions or by way of the blood stream by means of anaphylactic shock.

The question still remains as to the nature of the substance which produces this condition. It might be sought in the placenta, the fetal organism or the maternal organism and in particular in the endocrinosympathetic system. The syndrome is not due to hemorrhage which can be checked by hemostats or prompt surgical intervention. The secondary toxic rôle of the blood infiltration of the uterine walls has not been sufficiently demonstrated to justify systematic hysterectomy and as a matter of fact the surgical procedures empirically applied very often fail. In the future the treatment of uteroplacental apoplexy must be approached from the biological rather than the surgical angle.

EDITH SCHWACHE MOORE

Bolaffi R A Contribution to the Knowledge of Spontaneous Fractures in Pregnancy (Contributo alla conoscenza delle fratture spontanee in gravidanza) *Ginecologia Torino* 1937 3 593

Bolaffi reports the case of a twenty seven year-old primigravida in the seventh month of pregnancy whose past history was essentially negative. While walking along the street she suddenly experienced a severe pain in the left pelvic arch which incapacitated her completely. She was brought to the hospital by ambulance, a roentgenogram was taken and a diagnosis of spontaneous fracture of the pelvis was made. Figure 1 shows the roentgenogram of the fracture on the day following the accident. All other findings were negative. The diameters of the pelvis were found to be within normal limits. Fetal heart tones were present and were of good quality. Careful examination of the entire skeleton showed no deformations and no tender areas in the spinal column or inferior extremities.

Absolute bed rest was instituted in dorsal decubitus. Phosphorus and calcium were administered together with Vitamin D preparations and small amounts of adrenalin.

Eighteen days following the accident the roentgen ray control examination showed a marked improvement and forty days after the accident a distinct callus had formed as can be seen in Figure 2.

About three weeks later the patient had a normal labor and several hours later she gave birth in vertex presentation to a male child weighing nearly 7 pounds.

The third stage of labor and the puerperium were uneventful. The patient was ambulatory and in



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Fig 1 Roentgenogram taken the day following the fracture



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Fig 2 Roentgenogram taken forty days after the fracture, callous formation is shown



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Fig 3 Roentgenogram taken seven months after delivery and nine months after the fracture showing restoration and complete reconstruction of the two pubic rami

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Couvelaire A and Couvelaire R The Pathogenesis of Utero Placental Apoplexy (Apoplexies utero placentaires Essai de pathogénie) *Gynéc et obst* 1937 36 143

By the designation uteroplacental apoplexy, obstetricians of today signify certain acute cases of retroplacental hemorrhage with bloody infiltration of the genital apparatus but from a pathogenetic viewpoint the term is not justifiable. Under it have been grouped syndromes of similar pathogenesis whatever their location or degree, apoplexy limited to a placental cotyledon or a circumscribed area of the decidua recognizable only upon examination of the placenta after delivery, interuteroplacental apoplexy of no real danger to the mother, apoplexy involving the uterine walls and the whole genital region with severe clinical reactions and severe apoplexy involving simultaneously the liver, kidneys, stomach and nervous centers. Their common factor whatever their site or extent is that they are caused not by hemorrhage but by apoplexy. The pathogenesis of these processes is far from clear. However from a study of clinical, experimental and anatomical observations, conclusions as to the mechanism of production should be possible; this might be a step toward a less empirical therapy.

Toward the end of the nineteenth century it was discovered that these apoplexies were associated with lesions of the decidua known as endometritis and consisting of foci of cellular necrobiosis, thromboses and leucocyte infiltrations. In other words, common changes seen in many placentas toward the end of pregnancy that gave no trouble whatever. It was noted moreover that the apoplexy occurred chiefly in multiparas over thirty years of age and was associated with albuminuria. Premature senility of the uterine mucosa due to multiple pregnancies, puerperal infection and the chemotonic action of a preceding nephritis or hypothetical pregnancy toxemia were cited as causes. The determining cause of final rupture of the blood vessels was believed to be hypertension.

However, such a theory could account for only a certain number of cases; as in others no vascular lesions or preliminary hypertension could be demonstrated, and further studies indicated that a bursting of the capillaries rather than of the blood vessels was responsible. A certain vascular predisposition was observed, doubtless attributable to syphilis or some other hereditary taint.

By application of various poisons to the sympathetic system an attempt was made to demonstrate experimentally the probable releasing cause of these apoplexies. It was discovered that the best examples of uterine apoplexy were obtained in pregnant animals previously sensitized to various antigens. These findings suggested that uteroplacental apoplexy might belong in the category of visceral infarct

due to anaphylactic shock. By producing anaphylactic shock in guinea pigs by direct intraperitoneal injection of various substances, Couvelaire was able to produce genital apoplexy in two-thirds of his animals. He later obtained similar results with intravascular injections of histamine into guinea pigs previously sensitized to histamine by intramuscular or intraperitoneal injections. Thus genital apoplexy can be produced in rabbits and guinea pigs either by way of the sympathetic nervous system which controls the vascular functions or by way of the blood stream by means of anaphylactic shock.

The question still remains as to the nature of the substance which produces this condition. It might be sought in the placenta, the fetal organism or the maternal organism and in particular in the endocrino-sympathetic system. The syndrome is not due to hemorrhage which can be checked by hemostasis or prompt surgical intervention. The secondary toxic rôle of the blood infiltration of the uterine walls has not been sufficiently demonstrated to justify systematic hysterectomy, and as a matter of fact the surgical procedures empirically applied very often fail. In the future the treatment of uteroplacental apoplexy must be approached from the biological rather than the surgical angle.

EDITH SCHWABER MOORE.

Bolaffi R A Contribution to the Knowledge of Spontaneous Fractures in Pregnancy (Contributo alla conoscenza delle fratture spontanee in gravidanza) *Ginecologia Torino* 1937 3 593

Bolaffi reports the case of a twenty-seven-year-old primigravida in the seventh month of pregnancy whose past history was essentially negative. While walking along the street she suddenly experienced a severe pain in the left pelvic arch which incapacitated her completely. She was brought to the hospital by ambulance; a roentgenogram was taken, and a diagnosis of spontaneous fracture of the pelvis was made. Figure 1 shows the roentgenogram of the fracture on the day following the accident. All other findings were negative. The diameters of the pelvis were found to be within normal limits. Fetal heart tones were present and were of good quality. Careful examination of the entire skeleton showed no deformations and no tender areas in the spinal column or inferior extremities.

Abolute bed rest was instituted in dorsal decubitus. Phosphorus and calcium were administered together with Vitamin D preparations and small amounts of adrenalin.

Eighteen days following the accident the roentgen-ray control examination showed a marked improvement and forty days after the accident a distinct callus had formed, as can be seen in Figure 2.

About three weeks later the patient had a normal labor and several hours later she gave birth in vertex presentation to a male child weighing nearly 7 pounds.

The third stage of labor and the puerperium were uneventful. The patient was ambulatory and in

of the uterus, and thrombophlebitis limited to the placental site, or even to the broad ligament. However, the author recognizes the difficulty of making an accurate diagnosis of these conditions. He thinks hysterectomy may be indicated for certain of these types of puerperal sepsis if the diagnosis is made early enough and the procedure is not used as a last resort.

Several case reports are given illustrating the author's reasoning, as well as schematic drawings showing the location of the various types of pathology.

ROBERT M. GRIFR, M.D.

NEWBORN

Amati, G. • The Rôle of Obstetrical Trauma in the Pathology of the Newborn (Il trauma ostetrico nella genesi degli stati patologici propri dei neonati) *Folia demographica gynaec.*, 1937, 34, 17.

The author presents a detailed review of the principal lesions that the trauma of delivery can produce in the newborn. He describes the immediate and latent effect of the trauma, prophylaxis, and treatment.

The lesions are classified and discussed as follows: lesions of the skin, of the bony skull, of the central nervous system, congenital torticollis, ruptured blood-vessels, and the obstetrical paralyses.

The lesions of the skin are rarely of grave character. The majority occur as depressions or abrasions resulting from instrumental deliveries. The treatment consists of maintaining strict asepsis, and the prognosis is invariably good.

Lesions of the bony skull are depressions with or without fracture, the so-called "spoon depressions" of Michaelis. Commandeur recognizes three forms of obstetrical trauma to the skull, i.e., simple depression without fracture, depression with fissure or linear fracture, and fracture with fragmentation. The cause is compression of the fetal head against the superior strait or other obstruction along the birth canal as well as compression by the obstetrical forceps. The diagnosis is made by noting of the deformity of the skull together with the characteristic signs and symptoms of cerebral damage. It is difficult to make the prognosis, and it should always be guarded, in general it is dependent upon the gravity of the clinical picture, which Bue divides into four types as follows: (1) a state of apparent death as evidenced by weak heart beats, a few spasmodic respiratory movements, absent reflexes, and loss of muscular tone which do not respond to mechanical or medicinal stimuli, (2) a state of apparent death

which responds to stimuli, convulsions, either localized or generalized, often appear in this group, (3) a state of apparent death which readily responds to stimuli, (4) an initial asphyxia of short duration with a vigorous response to stimuli which is found in the more favorable cases. The treatment of depression fractures is divided into manual, or contra-pressure, and surgical.

The lesions of the central nervous system most frequently produced by trauma are those due to hemorrhage. They may vary from punctate to diffuse hemorrhages and their clinical manifestation depends upon their extent and localization. Cranial hemorrhage may be divided into extradural, subdural, leptomeningeal, ventricular, intracerebral, and spinal. Ventricular hemorrhages have been found to occur in 10 per cent of deaths from intracranial hemorrhage, leptomeningeal hemorrhages in 30 per cent, and tentorial hemorrhages due to tear of the tentorium cerebelli in 50 per cent. The primary cause is disproportion or error of technique in delivery. Diagnosis is made from the characteristic symptoms and findings. The prognosis is always grave, many infants dying within the first week, and some recovering only to manifest latent symptoms, such as epilepsy in later life. Cerebral hemorrhage has been shown to account for from 40 to 50 per cent of all neonatal deaths. Treatment is both prophylactic and active and consists essentially of extreme caution in all obstetrical intervention and careful handling of premature infants, as well as gentle use of all resuscitation methods.

Congenital torticollis may be evident at birth or make its appearance later. It is thought to be of traumatic origin in most cases although the genesis is not entirely clear. Since there is never a tendency toward spontaneous regression, the treatment necessarily must be corrective by one of the following methods: massage, immobilization with proper traction apparatus, or surgery, at the right age.

Fractures and dislocations of the extremities are always a result of direct trauma, although factors increasing the fragility of bone may be present. The symptoms are the usual ones of deformity, crepitation, and immobility. The prognosis is invariably good and the treatment is application of suitable support.

The obstetrical paralyses are facial, involving most frequently the seventh nerve, and brachial. Diagnosis is not difficult, as the symptoms are those of the usual classic paralyses. Proper support is the usual treatment and surgery is required very rarely.

GEORGE C. FINOLA, M.D.

Cesarean section has been advocated by a series of investigators but the author believes that this procedure is indicated only in cases in which the fetal diameters are large and the pelvis is normal otherwise. The author found that in fetuses weighing more than 3,500 gm the mortality rate was 83 per cent whereas if they weighed more than 4,000 gm the mortality increased to 50 per cent. It was necessary therefore to know the fetal dimensions. Roentgen ray films were found to be valuable in this respect.

Primiparity in an elderly woman always carries the highest fetal mortality especially in the presence of podalic presentation and therefore in cases of this type cesarean section is strongly indicated.

RICHARD E. SOMMA, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Lacomme. New Results Obtained in the Trial of a Prophylactic Treatment of Puerperal Infections at the Baudelocque Clinic. Interpretation of Results (Nouveaux résultats de l'essai de prophylaxie des infections puerpérales institué à la Clinique Baudelocque. Considérations sur l'interprétation de ces résultats). *Bull. Soc. d'obst. et de gynec. de Par.* 1937 26 459.

Since his original report in July, 1936, the author has continued his clinical trials of sulphanilamide as a prophylactic agent against puerperal fever. He now reports the results in a total of 3,039 deliveries.

Since the first report only minor changes have been made in the manner of administration and dosage of the drug. Carboxy sulphanilamido-chrysoïdine is now used instead of the chlorohydrate. The original dosage of 2 gm daily in eight divided doses of 0.25 gm each has been reduced to 1.6 gm daily in eight doses of 0.20 gm each. A total dosage of 8 gm, administered over a period of five days, was given to every woman who entered the Baudelocque obstetric clinic regardless of whether her condition was normal pregnancy or abortion.

Lacomme compares the incidence of infection during 1936 under the prophylactic regime with that in this clinic during the years from 1926 to 1934. During these years there has been no important change in the management of patients. Comparison of the febrile cases reveals the following data:

1. Benign infections of all types were less frequent in 1936.

2. Phlebitis was more frequent in 1936 though no deaths from embolism occurred.

3. Only 3 grave infections resulted fatally. 1 of these was present before the patient's admission to the hospital; the 2 others were not considered puerperal.

4. Seven patients with severe infection recovered. This number of severe infections was lower and the severity was less than in any other year previously.

The author discusses these statistics frankly. While not drawing definite conclusions as to the efficacy of the treatment, he is nevertheless im-

pressed by the apparent improvement which he hails as progress. He is unable to account for the paradoxical increase in the incidence of phlebitis and the lessened occurrence of fatal embolism. He suggests the possibility that the medication may have played some part in increasing the phlebitis. Another possible explanation is that infections which otherwise would have been grave were so lessened in severity by the medicament that they ran the course of a simple phlebitis.

In the discussion which followed Lacomme's presentation LANTIER points out that phlebitis has been increasing steadily during recent years even before the advent of chemotherapy. He points out that sulphanilamide is not entirely harmless. Several instances of apparent hepatorenal intoxication have been noted on his service. He advises against undue enthusiasm in evaluating present results.

LE LORIE states that he will soon report his results in 2,000 deliveries. He also has noted an increasing incidence of phlebitis and a lessened incidence of fatal embolism. No toxic effects of sulphanilamide were observed in his patients.

HAROLD C. MACK, M.D.

Lash, A. F. The Surgical Treatment of Puerperal Sepsis. *Am. J. Surg.* 1937 37 68.

Though the majority of all types of puerperal sepsis require general medical care and respond to these conservative measures, the author contends there are certain types which need surgical treatment. These pathological states are peritonitis beginning to spread, abscesses of any part of the uterus, adnexa or pelvic structures, certain local thrombophlebitis and certain intrapartum infections.

The diagnosis of spreading peritonitis should be made early based on the following findings: abdominal distention and pain, chills, tachycardia, emesis, rigidity, tenderness and diarrhea. It is recommended that a posterior colpotomy be performed as soon as a diagnosis is made even though there is no bulging in the cul-de-sac. The author found exudate in 23 of the 27 colpotomies. If an exudate was present a stuffed iodoform gauze and a rubber F tube were inserted into the cavity. The author believes that the gauze acts as a mechanical irritant and stimulates the peritoneum to produce an exudate which limits the infection in the pelvis. In no instance did he find that a colpotomy did any harm to a patient.

There are instances especially after full term deliveries in which abdominal drainage as well as colpotomy is necessary but the latter should be tried first. When an abscess is located high in the pelvic cavity and cannot be reached by colpotomy, abdominal drainage should be attempted first. Laparotomy offers the advantage of better exploration and a better opportunity for the removal or drainage of tubo-ovarian abscesses.

Hysterectomy is also recommended for necrosis of a fibroid suppurative metritis, localized abscess

of the urinary passages. The most careful investigations must first exclude tuberculosis before the diagnosis of non-tuberculous bacterial pyuria can be made. The treatment of choice is the administration of small intravenous doses of neosalvarsan.

(STELZER) LOUIS NEUWELT, M D

Illyés, G. von. Suppurations of the Renal Parenchyma (Ueber die Eiterungen des Nierenparenchyms) *Ztschr f Urol*, 1937, 43 141

All suppurative processes in the renal parenchyma with the exception of tuberculosis are discussed in this article. The author takes up first the mode of origin of suppurations and divides them into hematogenous, urogenous, and lymphogenous infections. Clinically, he distinguishes three main groups: (1) suppurative nephritis, (a) circumscribed or scattered small or large abscesses, (b) renal carbuncle, (2) suppurative pyelonephritis, and (3), pyonephrosis, contracted kidney.

The mode of origin, pathological anatomy, symptoms, diagnosis, and treatment of the different clinical forms are discussed at length with illustrative cases and numerous pictures. These discussions should be read in the original. Only the most important of the statistical data yielded by the clinical material can be presented here.

The total number of cases of suppuration of the kidney was 2,616, of which 1,354 were of tuberculous nature and 1,262 were non-tuberculous. Operation was done in 1,079 cases of the latter group.

There were 41 cases of miliary abscesses, 38 of which were hematogenous, and 3 lymphogenous. In 32 decapsulation was done, and in 6 nephrectomy. Thirty-nine of the patients were cured, and 2 died. There were 5 cases of renal carbuncle. Nephrectomy was done in 4 cases, and the individual abscesses were opened in 1 case. Four of the patients were cured and 1 died.

There were 404 cases of suppurative pyelitis, and operation was performed in 434. The total mortality was 4.3 per cent. Of 207 patients with pyelitis during pregnancy, 16 were operated on, there were 2 nephrectomies and 14 decapsulations.

There were 713 cases of pyonephrosis, and operation was done in 590. The mortality of the cases in which operation was done was 8 per cent. There were 1 case of contracted kidney with stone, 1 case of infected hydronephrotic contracted kidney, 1 case of contracted kidney caused by infarcts, and 1 case of pyelonephritic contracted kidney. The kidney was removed in all 4 cases.

(V SCANZONI) FLORENCE A CARPENTER

Barringer, B. S.: Radiosensitive Kidney Tumors *J Urol*, 1937, 38 1

Within the last several years irradiation of kidney tumors has been advocated as a possible means of curing these tumors.

The pathological anatomy of testicular tumors is quite different from that of kidney tumors. The original arterial supply to the retroperitoneal glands

is very small, that to the kidney large; the glands are fixed, while the kidney is movable. If one of the principal effects of irradiation is achieved by the sclerosing of the blood vessels then we would expect more permanent results in testicular than in kidney tumors. This is apparently true.

Early experience with the large Wilms' tumors of childhood proved them to be quite as radio-sensitive as the metastatic teratomas. They showed the same remarkable primary reduction in size. The regression seemed to be only temporary. The kidney tumors grew again after a few months. When again irradiated they did not recede as readily as at first, and if irradiation alone were used the patient succumbed to the disease. This led to the suggestion by Randall, Waters, and others that following the primary regression, removal of the remaining small kidney tumor might offer possibilities of cure.

The record in cases in which kidney tumors have been removed after irradiation is not brilliant. The life span has apparently not been much lengthened. Unquestionably, the operative hazard is much less if the kidney becomes smaller following irradiation. One cannot escape the very positive conclusion that incising these tumors for diagnosis is inadvisable. If the kidney is not removed one should be content to base the diagnosis upon the pyelogram, the presence of the tumor mass, and its reaction to irradiation. Once in a while an exception appears, and incision into a kidney tumor apparently does no harm. Theoretically, the trauma resultant from the exploration, the attempt at removal, or the actual removal of a Wilms' tumor is ideal for releasing tumor cells which enter the blood stream and cause distant metastases.

This series of cases is too small, however, to give much support to the theory that the trauma of nephrectomy causes metastases. Transperitoneal nephrectomy is the operation of choice and should prevent metastases in a certain percentage of cases. As measured by the pathological reports of removed and irradiated kidneys and by end results, sufficient irradiation to control the primary tumor was not or could not be given in this series. Many years ago, when x-ray treatments were first used, one massive dose or several large doses in a short period of time was the method used. The trend of the time has been toward smaller doses prolonged over a longer time. In a certain number of cases high voltage roentgen treatment, if properly given, can indefinitely control Wilms' tumors of the kidney.

From observation of irradiation effects upon children, one is impressed with two reactions. Apparently the skin of children stands irradiation better than that of adults, but the general condition of children is more affected. In particular they develop a leucopenia, the hemoglobin and red blood cells remain unaffected or even increase. The author has been able to collect from the literature and his own records, 6 cases in which irradiation alone has apparently controlled the disease. The fact that

GENITO-URINARY SURGERY

ADRENAL, KIDNEY AND URETER

Wilkinson J F Extracts of Suprarenal Cortex in the Treatment of Addison's Disease *Lancet* 1937, 235 61

The value of suprarenal cortical extracts in the treatment of Addison's disease was investigated on behalf of the Therapeutic Trials Committee of the Medical Research Council. Nine patients with typical uncomplicated Addison's disease and two standard commercial preparations, cortin and eucortone were used for the tests. A dose of cortin which is a clear solution represents 50 gm. of fresh suprarenal gland per 1 c cm. in a 10 c cm. vial and contains 1 rat muscle recovery unit. A dose of eucortone contains 30 gm. of fresh suprarenal cortex per 1 c cm. in a 25 c cm. vial. The full quantity of both preparations was usually given at one time up to 10 c cm., and divided doses were given intramuscularly when greater than this amount was necessary, larger doses were usually given intravenously. In one injection eucortone is now issued in more concentrated form in 10 c cm. vials.

Four patients died despite intensive treatment 3 from Addison's disease and 1 in remission from cardiac muscle failure. Two of these had shown tuberculosis and a complete atrophy of the suprarenal glands. Five patients responded to treatment very well for periods varying from nineteen months to three years and 1 month. One had a chronic condition of moderate severity and 4 had acute severe conditions which responded to the extracts and are now on a maintenance diet of sodium chloride.

Large doses of extract have often been required they are safe if given intramuscularly or intravenously and without unpleasant reactions. After satisfactory responses the dose can be reduced considerably and if combined with salt therapy even greater reduction in dosage is possible. The maximum total amount of extract given to any one patient during treatment was 3 litres while the minimum total amount required was 65 c cm.

With these extracts the symptoms of asthenia muscular weakness digestive disorders particularly nausea and vomiting and diarrhea are promptly relieved the appetite returns the weight increases the mental outlook improves and the pigmentation slowly fades. The subnormal temperature improves slightly, but the occurrence of pyrexia is a bad prognostic sign and even very large doses of cortical hormone may be unavailing. The blood pres. ure may take from two to three months to show significant improvement and then only if cortical extracts are given with or followed by sodium chloride therapy. Changes in the chemistry of the blood and urine show rapid responses to adequate amounts of the extracts. A high blood urea returns to normal quickly with a simultaneous disappearance of album

in casts and cells from the urine. Sodium chloride and phosphate values return to normal in the blood. There is no effect on the slight hypochromic microcytic anemia and the basal metabolic rate is also unaltered.

Suprarenal cortical extracts are of very definite value in Addison's disease if given in adequate dosage. Their administration is the only treatment of any value in acute crises. Five of the 9 patients reported had excellent remissions and are practically in normal health now as a result of treatment. One patient lived eight months but died from another cause during a period of steady remissions. Two others were benefited temporarily until sudden crises with pyrexia failed to respond to further treatment.

LORTS NEUWELT M.D.

Schaffhauser F. The So Called Abacterial Renal Pyurias (Die sogenannten abakteriellen Pyurias) *Ztschr. f. Urol.*, 1937 45 83

The author presents a report on 19 cases of so-called abacterial pyelitis. The disease picture pathologically anatomy cause treatment and animal experiments are discussed. As regards the development and the clinical course the disease showed so much similarity with the cases reported by Soederlund in 1922 that the author felt justified in assuming it to be an independent disease picture. Its origin is still undecided. A tuberculosis of the urinary tract could be excluded on the basis of careful clinical bacteriological and histological investigations. Some investigators consider an infection from a still unknown and undemonstrated virus or an injury from toxic excretory products as possible. According to the author's experiences streptococcus infections with an unusual course might be the cause in some of the cases. A marked similarity to the reported cases was that it showed the artificial inflammations of the renal pelvis of Becker in which the bacteriological investigation led to a negative result in spite of proved infection.

The demonstration of a sterile renal suppuration is not sufficient for the assumption of a special disease picture. The abacterial suppuration of the renal pelvis is a common sign of apparently abacterial stages of various acute and chronic infectious diseases of the kidney and the renal pelvis in which the demonstration of the excitant often succeeds only after repeated bacteriological controls. Usually the excitants are staphylococcus more rarely, streptococcus gonococcus or colon bacillus infections. The histological examination of the kidneys removed because of abacterial pyuria almost always reveals tubular pyelitis. The toxic suppurations of the renal pelvis never lead to severe suppuration and should be definitely differentiated from the abacterial pyurias. An abacterial pyuria is suggestive of tuberculosis but never an evidence of a tuberculosis.

ful pedicle dissection will enable the operator, before attempting hemi-nephrectomy, to ligate the vessels supplying blood to the segment to be removed. This procedure simplifies the surgical technique inasmuch as the amputation may be made in a distinctly non-vascular line of cleavage and hemostasis can be accomplished again by simply tying capsular flaps with natural ribbon sutures over a pad of fat or muscle covering the raw surface. In removing segments of anatomically normally formed kidneys an aberrant vessel may be clamped off, which procedure accomplishes much the same purpose, and the situation is handled in much the same manner as in double kidney. However, it is often necessary to amputate the segment to be removed without stopping the blood supply to that segment. The operator can control hemostasis by grasping the kidney just above the line of amputation with his thumb and forefinger, cutting out the wedge-shaped piece to be removed, placing his mattress ligatures through the kidney substance, and tying both sides over fat or muscle.

The results in this series of cases were as follows. There was no immediate mortality. One of the hemi-nephrectomies in the series of patients with horseshoe kidney resulted in death from metastases a little over a year after operation. Another patient developed calculous nephrosis of the remaining half of the kidney, but is living twelve years after the primary hemi-nephrectomy. There was no mortality from any of the operations upon the double kidneys or upon the anatomically normally formed kidneys.

Hemi-nephrectomy is indicated in all cases in which pathology necessitating surgical treatment is limited to a section of any kidney, whether it be a horseshoe, double, or an anatomically normal kidney. It is indicated particularly in cases of single kidney in which surgery is necessary for the same reasons, and, finally, it should always be considered in all planned surgical attacks upon the kidney in an endeavor to preserve all the functional parenchyma possible.

C TRAVERS STEPITA, M D

BLADDER, URETHRA, AND PENIS

Gay, D M.: The Pathology of Aniline Tumor of the Bladder. *J Urol*, 1937, 38 221

The author classifies aniline tumor of the bladder as follows

Grade 1. A benign papillary tumor with a delicate single or branched stalk, covered with relatively normal bladder epithelium. This tumor may be single or multiple.

Grade 2. A papillary carcinoma similar to the Grade 1 tumor, with an atypical appearance or arrangement of some of the epithelial cells, an occasional invasion of the stroma, or an excessive number of mitoses.

Grade 3. An obviously infiltrating carcinoma in which a large proportion of the cells are atypical in appearance and arrangement.

Grade 4. A very anaplastic infiltrating carcinoma, the cells of which are practically all atypical and show very slight or no differentiation.

The author states that it has been his experience that tumors occurring on sites of previously destroyed growths are of the same, or of a higher degree of malignancy than the primary tumor. He admits that little is known of the factors that influence the malignancy of bladder tumors and that they may become increasingly malignant with the passage of time. Seven fatal cases are reported in which the bladder tumor was the direct or indirect cause of death, and in 5 of these the tumor was in the bladder neck or anterior wall. Autopsy failed to show any changes, other than those in the urinary system, which might be attributable to exposure to aniline products.

Two general theories are advanced to explain the mechanism by which the toxic agent reaches the bladder and exerts its effect. One is the quite natural suggestion that the injurious agent is excreted with the urine and directly affects the bladder mucosa. The other concept presupposes a special susceptibility of the tissues of the bladder to an injurious agent acting through the medium of the circulating blood. Both theories await experimental demonstration. Vascular lesions such as have been described are frequently observed in epithelial tumors elsewhere in the body, and Kreyberg has produced them in the skin of mice by painting with tar. The distribution of bladder lesions does not support the theory of urogenous origin. In the author's experience, the majority of such lesions were situated above the level of the ureteral meatus rather than in the most dependent part of the viscus where one would expect to find the injury from a substance in the urine.

The author concludes his article with the following remarks:

Aniline disease affects the entire bladder and occurs most frequently in the lower half of the viscus above the level of the ureteral openings.

The sequence of events begins with endothelial proliferation in focal subepithelial blood vessels. Occlusion of a vessel causes dilatation of the afferent capillaries and edema of the surrounding tissue. Ectasia and proliferation of the capillaries form a mass of vessels which persist for months, or may be followed by proliferation of the basal layer of overlying epithelium with the formation of tumor.

The sequence of vascular and epithelial lesions may be repeated indefinitely and various stages of development, as well as different grades of tumor, may coexist.

J SYDNEY RITTER, M D

Harbach, F. O.: Primary Carcinoma of the Male Urethra. *J. Urol*, 1937, 38 311

Carcinoma which arises primarily in the urethra is rare. The majority of patients give a history of some form of chronic irritation. The growth appears most often in the perineal or membranous portion of the urethra and much more rarely in the penile portion.

such cases exist encourages him to persist in exploring the possibilities of high voltage irradiation.

Pre operative irradiation of kidney tumors marks a great step in the advancement of the control of these tumors. From the case reports compiled from this work it seems that irradiation alone gives better end results than irradiation followed by nephrectomy. Irradiation in smaller doses prolonged for a longer period of time seems to be the method of choice in the control of these tumors.

C TRAVERS STEPIA M D

Hess E. Hemi Nephrectomy *J Urol* 1937 38 43

Hemi nephrectomy has been done on numerous occasions with excellent results by various men to remove pathological halves of horseshoe and unilateral fused kidneys. These kidneys are prone to give subjective symptomatology because of their anomalous position and blood supply. The symptoms will be aggravated by any considerable pathological change in one or both sections and will require some form of cystoscopic or surgical treatment as a result thereof. Hemi nephrectomy is indicated often when the process is limited to one segment.

Double kidneys either unilateral or bilateral are prone to pathological changes of a clinical nature because of their anomalous formation, position and blood supply and therefore may require treatment or operation. As a result of the efforts of various men to conserve healthy renal parenchyma by removal of diseased sections of kidneys, the operation of hemi nephrectomy or resection has also been attempted upon anatomically normal kidneys.

There were 16 cases of horseshoe and unilateral fused kidneys observed by the writer 6 of which required definite surgical intervention 4 were treated by hemi nephrectomy. Of over 100 cases of unilateral or bilateral double kidneys with double ureters 9 required surgical intervention. Seven of these were hemi nephrectomized for pathology limited to the upper or lower pole and 1 to relieve incontinence because the ureter from the upper half opened into the urethra in a young female 1 which should have been hemi nephrectomized was nephrectomized. In the other group of cases hemi nephrectomy was performed to remove pathological lesions in either the upper or lower pole of anatomically normal kidneys that could not be considered anomalous with the fact in mind however that many anatomically normal kidneys have an abnormal vascular supply. In this series there were 11 hemi nephrectomies. The urologist is qualified by training and experience to judge much more accurately when the renal parenchyma should be conserved. Nephrectomy is a comparatively easy operative procedure and it has been stated that 30 per cent of the kidneys now removed by both urologists and general surgeons could have been saved in whole or in part had the conditions been thoroughly studied pre-operatively and an attempt made at operation to conserve as much as possible of the renal parenchyma.

Several operators have done partial resection of the kidney for carbuncle but the vast majority of the men feel that simple incision and drainage or total nephrectomy is the procedure of choice. One of the most important indications for hemi nephrectomy will arise often in bilateral calculous disease. In this condition it is absolutely necessary to conserve as much as possible of the parenchyma. The infecting agent is very important. The staphylococcus is the one most dreaded not because it is the immediate killer but because certain types of the organism seem to have a special result namely the slow progressive destruction of renal tissue. In bilateral calculosis with a staphylococcus infection the preliminary pre-operative treatment consists of large and small doses of neoarsarsol. Hydronephrosis, calculous nephrosis, calculous pyonephrosis, or uninfected calculous disease limited to a segment of one kidney can very often be treated successfully by hemi nephrectomy.

In this series there were 11 cases

1 Five with total nephrectomy on one side and hemi nephrectomy on the other indicating bilateral calculous pyonephrosis and hydronephrosis.

2 Five cases of calculous disease 3 of which were limited to the upper pole and 1 limited to the lower pole. When the lower pole is found to contain a dilated calyx with pus or calculus it is wise to do hemi nephrectomy and obliterate the infected lower calyx which because of gravity will become filled with infected urine and as a result of this will cause the reformation of a stone or extension of the infection to the rest of the kidney.

3 One case of pyonephrosis limited to the lower pole of a kidney complicated by a perirenal inflammatory process. The upper two thirds of the kidney were free from perirenal inflammation and presented grossly normal parenchyma.

All of the cases in this series in which hemi nephrectomy was done for horseshoe kidneys were approached through the usual lumbar retroperitoneal exposure. It is advisable whenever possible to sever the isthmus with the actual cautery or electrosurgical knife. It is also advisable whenever possible to ligate and divide those vessels which go to the isthmus. This procedure frees the remaining half and allows it to assume a more nearly normal position. As a rule an aberrant vessel or vessel feeding the isthmus and lower poles arising from the iliacs or a low position on the aorta will be discovered. If these are ligated the divided isthmus can be banded with very little danger of hemorrhage by tying over the cut around a piece of muscle or fat with claps deliberately made from the renal capsule. If this is not possible mattress sutures tied on pads of fat or muscle usually control the hemorrhage satisfactorily. In the removal of the half of a horseshoe kidney it is essential to attempt to free the ureter sufficiently to insure adequate drainage from the segment saved.

In double kidney there is usually a distinct blood supply to both portions of the double kidney. Care

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patient, and skilled urological observation to determine, among other things, the type and configuration of the prostate before treatment, and whether any alteration takes place after it, are essential. In no other way can this treatment be based on the sure foundation of fact, and a proper estimate of its value be obtained.

ELMER HESS, M D

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Chauvin, E., and Mosinger, M.: The Cancerization of Prostatic Adenoma in Connection with Its Frequency and Histological Mechanism (A propos de la cancérisation de l'adénome prostatique en particulier de sa fréquence et de son mécanisme histologique) *J. d'urrol méd et chir*, 1937, 44 97

In their series of 115 cases of hypertrophied prostate removed by suprapubic operation, the authors found 6 cancers (5.22 per cent). They believe that the statistics of other investigators who had a higher incidence of cancer can be explained by the fact that autopsy figures were used, as naturally cancer will cause a higher percentage of prostatic deaths. Up to twenty years ago prostatic disease was operated on during much later stages, and therefore the incidence of cancer was higher in early statistics. The authors emphasize the fact that probably only through routine biopsy can this question be settled, but this procedure is not without danger.

They point out five processes concerned in the genesis of cancer of the prostate and conclude from their histological studies that prostatic carcinoma has a "pluricentric" origin rather than a "monocentric" origin. They believe that cancerous adenoma arises in lobules which are already adenomatous rather than in healthy glandular lobules.

THEOPHIL P. GRAUER, M D

Caulk, J. R.: Carcinoma of the Prostate. *J. Urol*, 1937, 37 832

The author believes that few, if any, cases of prostatic carcinoma have ever been cured. Our present methods all tend to relieve the symptoms and increase the comfort and length of life of the patient, with the hope that a cure may be effected.

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THEOPHIL P. GRAUER, M D.

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The symptoms are those of lower urinary tract pathology. Every case of urethral fistula and stricture should be regarded as a potential case of urethral carcinoma. This may seem as though one is looking for the pathological rarity, but when one considers that an early diagnosis will save a life, this seemingly unnecessary vigilance is excusable.

The consensus of opinion is that operation offers the best chance of cure. If the growth is located in the penile portion of the urethra, partial amputation may be done with success, but one must be certain that metastases have not been carried posteriorly by instrumentation. Flamm believes instrumentation may cause mechanical dispersion of metastases. The presence of tumor in the membranous urethra necessitates complete amputation with transplantation of the urethra. Complete emasculation is not only unnecessary but is mutilating.

The prognosis must necessarily be guarded. Naturally the earlier the diagnosis the more hope of cure. Diehl reports the mortality rate as 80 per cent, but this seems high.

HARRY W. FLAGGMEYER, M.D.

GENTIL ORGANS

Rusch H P and Kundert P R. Hormone Excretion in Cases of Prostatic Hypertrophy. *J Urol*, 1937 38 316

The authors conclude that there is no significant change in the amount of urinary estrogenic hormones in cases of prostatic enlargement as compared to normal individuals.

The average amount of androgenic substances excreted by men suffering from prostatic enlargement is significantly lower than that of normal individuals.

There is a significant change in the ratio of the female to the male hormone indicating that there is a relative decrease of the latter hormone in individuals with benign prostatic enlargement. These findings tend to substantiate the theory that some cases of prostatic hypertrophy may be the result of a disturbed balance of the sex hormones.

HARRY W. FLAGGMEYER, M.D.

Lett H. The Treatment of Prostatic Obstruction Other Than by Prostatectomy. *Brit J Surg* 1937 25 191

Per urethral resection with the cutting current was received with enthusiasm. It seemed that prostatectomy could be replaced by a simple and minor procedure associated with little shock and followed by such a short convalescence that patients could leave the hospital in a week or less. However disturbing reports of death from hemorrhage, ruptured bladders and extravasation pelvic cellulitis and general peritonitis, apart from such sequelae as serious infection of the kidneys, rectovesical fistula and incontinence showed the dangers of resection and proved that it should be performed only by men who had a wide experience in cystoscopy and cysto-urethroscopy. The operation has been on trial

for about seven years and it has been very widely practiced, particularly in the United States.

The dangers of the operation are sepsis, hemorrhage, excessive or wrongly directed coagulation and the introduction of instruments that are too large for the caliber of the urethra. These various dangers are completely and thoroughly discussed. The caliber of the male urethra varies; it is appreciably smaller than normal; it is not possible to introduce the resectoscope without injury. At least 4 per cent of the cases were found to be unfit for resection by Millin because of this condition.

The author believes that a further resection five or six days after the first operation is generally necessary when the growth is large or if an inadequate amount was removed at the first attempt. Recurrence also occasionally follows transvesical operations in which the bladder neck has been divided or partially resected.

Unsuspected carcinoma is sometimes found and varies from 10 to 20 per cent in what is ordinarily considered as a strictly adenomatous enlargement, and this has been brought forward as an argument against resection.

There are many urologists in the United States who now limit resection to 25 or 30 per cent of their cases. This corresponds fairly closely with the present practice of most of the urologists here and on the Continent. Kenneth Walker says that he employs resection in only 20 per cent of his cases while Millin, who introduced resection by the endothermy loop in this country in 1930 and has an experience of over 400 cases, finds that during the years 1932 and 1933 he performed resections in 90 per cent of his cases but now only 33 per cent are being treated in this manner.

Prostatectomy is still the most satisfactory operation in all cases of moderate or pronounced enlargement when the general condition of the patient is sufficiently good. The cure is complete and sepsis leading to serious complications or prolonged discomfort is far less common than after resection. The mortality in comparable circumstances is no greater after prostatectomy than after resection and it is probably less.

Much has been written on the anatomical origin of the enlarged prostate, on its pathology and on the reasons for its occurrence. For many years the adenomatous or fibromyomatous formation was regarded as a new growth or a true tumor but in 1910 Paul maintained that the evolution of the prostate was entirely controlled by the internal secretion of the testis. It seems probable that prostatic hypertrophy is essentially the result of a hyperplastic regenerative and compensatory process analogous in many respects to the regeneration which takes place in the normal prostate.

The relation between the gonads and the secondary sexual organs has long been recognized and in 1893 White tentatively discussed the possibility of treating prostatic hypertrophy by castration. This was not successful.

The great progress of endocrinology and biochemistry, stimulated perhaps by the effects of castration, has made it seem probable that the male hormone proper is secreted by the interstitial cells of the testis and that the hormone is the main factor in the development and control of the prostate. There have been many theories advanced as to the interrelationship between enlargement of the prostate, the testis, and the pituitary gland.

Lower and McCullagh, who advanced the inhibition theory, claim that by giving an extract of testicular substance equivalent to 60 gm of the testis of an ox they have relieved the symptoms in 63 per cent of 75 cases, and say that almost equally good results have been obtained by other medical men to whom they have forwarded supplies of the extract.

Hamilton, Heslin, and Gilbert question this theory. We are still groping in a dim light, if not actually in the dark, but the relief of symptoms which Lower and McCullagh obtained in their cases by the administration of whole testicular extract is suggestive, and it will be most interesting to see whether the administration of testosterone alone will be able to produce similar or even more striking results.

It is difficult to assess the real value of the Steinach II operation and the place it should occupy in the treatment of prostatic enlargement. The balance of evidence suggests that the operation may occasionally relieve symptoms to some extent when the prostate is large and adenomatous, and in a few cases of retention it appears to have had a dramatic effect within a few hours. There is, however, no satisfactory evidence that it can cause any reduction in the size of the prostate, and there is considerable probability that after a time the symptoms will recur. Further, the practice of this operation may lead to serious delay if the kidneys are already affected or if the prostate is the site of an unsuspected carcinoma.

The author draws the following conclusions:

Prostatectomy is still the operation of choice in moderate and large hypertrophies.

Per-urethral resection is valuable in the case of contracture of the bladder neck, small obstructions, certain cases of carcinoma, and, with special precautions, in feeble patients with large prostates who are not suitable for prostatectomy.

The Steinach II operation may give some relief from symptoms under certain conditions, but its effects appear to be transitory, and by delaying prostatectomy it may be responsible for serious consequences.

Treatment by hormones, though still in its infancy, seems to hold out a promise of relief in early cases and in those in which the prostate is large and adenomatous, but real progress can only be made in this, as in so many other branches of medicine and surgery, by close cooperation between clinicians and workers in the laboratory. A full and detailed account of the previous history of the

patient, and skilled urological observation to determine, among other things, the type and configuration of the prostate before treatment, and whether any alteration takes place after it, are essential. In no other way can this treatment be based on the sure foundation of fact, and a proper estimate of its value be obtained.

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THEOPHIL P GRAUER, M D.

Ferguson R S The Diagnosis and Treatment of Early Carcinoma of the Prostate *J Urol* 1937 37 774

Ferguson describes in detail the aspiration method of obtaining biopsy material in patients suspected of having prostatic cancer. The function of this method is to differentiate neoplastic from non-neoplastic tissue. Attempts to classify tumors, or to grade them by this method have failed, except in rare instances. The statistics tend to prove that the accuracy of the method improves according to the experience of the surgeon making the autopsy and that of the pathologist studying the biopsy material.

The author also describes an operation for implanting radon seeds into the cancerous prostate through a cystotomy opening. The seeds are more accurately spaced by implantation through a perforated plate which fits over the vesical surface of the prostate and by the use of an ordinary radon seed applicator. Of 14 patients operated upon more than three years ago 2 developed urethrectal fistulas in 2 others the bladder failed to close. Four are still living without evidence of active cancer.

THEOPHIL P GRAVER M.D.

Giuliani G M A New Operative Method for the Treatment of Abdominal Inguinal and Subcutaneous Ectopy of the Testicle (Nuovo metodo operatorio per la cura della ectopia addominale inguinale sottocutanea del testicolo) *Arch Ital di chir* 1937 46 361

Giuliani states that in the past abdominal ectopy of the testicle has been treated surgically by castration but this type of operation has become obsolete. The author has modified the most common surgical procedures used at present according to the anatomical conditions present in the various forms of cryptorchidism.

Cryptorchidism occurs predominantly in premature infants. The incidence is from 0.02 to 3 per cent. The three most commonly encountered forms are (1) subcutaneous ectopy in which the testicle is

at the external orifice of the inguinal canal (2) inguinal ectopy, in which the testicle is at the internal orifice of the inguinal canal and (3) abdominal ectopy in which the testicle is in the scrotum behind the bladder. Each of these cases requires different surgical approaches.

In general the operation should be performed before the advent of puberty. With the present surgical method adopted by Korher, Torkel and Ombredanne failures have been reported in a minimum of 10 per cent and a maximum of 44 per cent of the cases.

In his technique, the author departs from the fundamental principle that in all operations for ectopy of the testicle the course of the spermatic cord and the testicle to the scrotum should be shortened as much as possible. This is accomplished essentially by (1) eliminating all the tortuosities of the spermatic vessels which gives an advantage of from 4 to 5 cm, (2) transplanting the spermatic cord medially, which gives an additional advantage of 2 cm, and (3) placing the testicle in a vertical position which gives an advantage of from 2 to 3 cm.

In the subcutaneous form of ectopy the author makes an incision parallel to the inguinal arch as in humans. The spermatic cord after isolation of the spermatic vessels and the vas deferens, is brought to the level of the internal inguinal orifice under the epigastric vessels and the testicle is allowed to pass into the scrotum where it is left freely. Figure 1 shows one stage of the procedure.

For the inguinal form the author suggests an umbilicopubic incision. Bogros space is reached and the vas deferens is isolated near the external vessels. The spermatic vessels are also isolated along the entire course beginning at their origin from the aorta. The spermatic cord then is passed under the vesico-umbilical ligament. The testicle appears between the two recti muscles whence it is passed into the scrotum without fixation. Figure 2 shows the end step of the operation.

The abdominal form of ectopy requires an umbilicopubic incision. The spermatic vessels and vas



Fig 1



Fig 2



Fig 3

Fig 1 Subcutaneous ectopy. Passage of the spermatic cord under the epigastric vessels.

Fig 2 Inguinal ectopy. Placement of the testicle into the scrotum, bringing it in front of the pubis between the

distal insertion of the recti muscles. Suture of the posterior wall of the inguinal canal.

Fig 3 Abdominal ectopy. Removal of the testicle from the pelvis to the origin of the thigh.

deferens should be isolated, and they are passed under the vesico-umbilical ligament. An incision is made along the ischiopubic branch, and the urogenital diaphragm is opened. From these two openings the testicle is delivered through the pelvis. After the scrotum has been opened, the testicle is introduced and is left there unfixed. Figure 3 shows part of the procedure.

The author treated 4 cases of abdominal, 7 of inguinal, and 6 cases of subcutaneous ectopy occurring bilaterally and unilaterally in this manner. The patients were followed up for thirty-eight months. None of them presented any complaints.

RICHARD E. SOMMA, M.D.

MISCELLANEOUS

Parker, G.. The Extra-Urinary Causes of Urinary Obstruction. *Brit J Urol*, 1937, 9, 231

The female urethra from the meatus to the internal vesical sphincter is rarely obstructed except as the result of direct violence or fractures in the region of the symphysis pubis. However, acute and even chronic urinary obstructions can arise at this level from hematocolpometra.

Falling across a bar with extensive bruising of the perineum in the male gives rise to acute urinary obstruction, but unless the urethral lining epithelium is actually broken, or sepsis develops in the hematoma around the urethra, no permanent obstructive lesions result. Occasionally a hydrocele may obstruct the male urethra.

Acute inflammatory conditions originating in the region of the rectum occasionally produce retention in the male. There are conditions in the upper end of the urethra and bladder neck in both sexes that may cause obstruction.

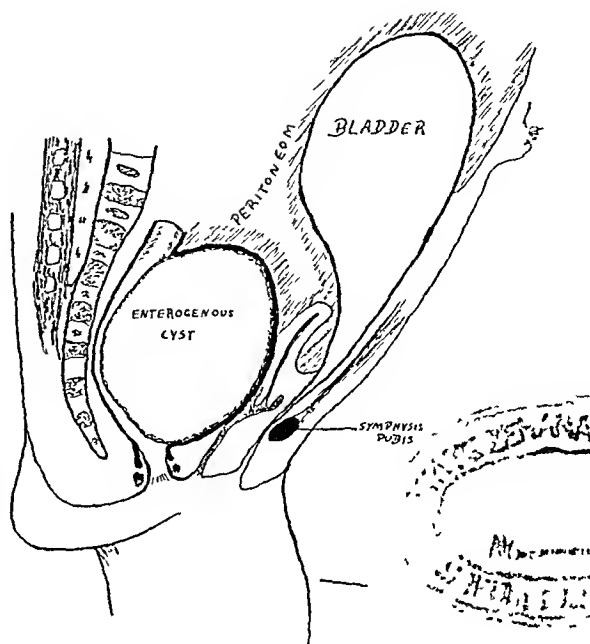
Both enchondromas and malignant chordomas have been diagnosed as hypertrophy of the prostate. Tumors of Muller's duct may cause retention.

Pelvic appendiceal abscess has caused both bilateral hydro-ureters and hydronephrosis.

Urinary obstruction at the bladder base due to hydatid disease is not extremely rare. Impacted fibroids and cystic tumors of the broad ligament have been known to cause complete retention.

Malignant disease, of course, is often the cause of urinary obstruction. X-ray therapy for malignant disease may completely destroy the lower end of either one or both ureters, and require nephrectomy or transplantation of the ureters to cure the condition. There are times when the gravid uterus causes definite retention and acute hydronephrosis.

Among the important factors are adnexal and parametrial infection, and the various surgical methods employed in their treatment may cause obstruction of the pelvic ureter. Very often the ureters are more badly damaged by interference with their blood supply than by true trauma of the ureteric wall. There is no question that ligation of the ureters occurs in various pelvic operations and causes hydronephrosis and pyonephrosis.



Hematuria is by no means uncommon after the operation of anterior colporrhaphy. An anterior and posterior colporrhaphy had been done in the hospital by a resident with little gynecological experience, and retention with profuse hematuria followed. The author saw the patient six hours later, by which time she was complaining of left renal pain. On cystoscopy the bladder wall appeared uninjured, although the trigone and base were injected. The right ureteric orifice was normal, but the left was edematous and contained a blood clot, and no efflux was seen. A well lubricated catheter was introduced and passed up to the kidney after it encountered some difficulty in the lower three centimeters. The catheter came out forty-eight hours later and no further trouble followed. Undoubtedly, the ureter was injured at the time of operation. The ureter may be caught in and compressed by adhesions following operations upon the colon and cause a hydronephrosis or pyonephrosis of the kidney on that side. Later nephrectomy may be necessitated.

The author asks the following questions:

1. What happens to the ureter on the affected side during an attack of acute salpingitis, when there is edema of the intraligamentous fascial planes, with or without symptoms of vesical or ureteric irritation?

2. What is the typical urographic picture in late cases of pelvic inflammation which have been treated by local applications, ultra-short-wave therapy, vaccines, and, in fact, any treatment other than operative?

3. What is the urographic picture in a similar large series treated early or late by surgical means?

In a personal series of 17 cases of renal obstructive lesions treated by various methods as the condition demanded 9 were due to pressure causes originating outside of the urinary tract 8 were believed to be due to obstructive lesions of primary urinary origin, though one of the patients had had a previous abdominal operation on the same side, and another had suffered from time to time with a purulent vaginal discharge. Of this series 6 were women and 2 were men. Of the 9 patients with obstruction from extra urinary causes 8 were women and 1 was a man. The case of the man will be referred to later. Of the 8 female patients 4 had an earlier history of a purulent vaginal discharge. Three of the patients had had a pelvic operation, which in 1 included a hysterectomy. The fourth patient with a large pyonephrosis had had a purulent vaginal discharge but no previous operation.

Occasionally a postcaval ureter will cause hydro-nephrosis. In a series of 66 cases of non calculous obstruction at the ureteropelvic junction 18 were extra urinary and were due to fibrous bands and retroperitoneal adhesions.

Interference with the nervous mechanism involved in bladder emptying, fractures and gunshot wounds of the vertebral column, tuberculous disease of the spine and extradural and intradural tumors of the cord may cause urinary obstruction.

The treatment of these conditions is of course the removal of the cause and if the cause cannot be removed various conservative operations may have to be performed with occasionally ureteral transplantation into the intestine or to the skin and nephrectomy. ELMER FLESS M.D.

Chapman E. M. and Hayden E. P. Lymphogranuloma inguinale. A Clinical Study of 30 Cases of the Sixth Venereal Disease in Natives of New England. *New England J Med* 1937 217 45

Clinical notes on 30 cases of lymphogranuloma inguinale which illustrate the significant features of the disease are presented. It is usually venereal in origin, having its onset with a genital lesion that may pass unnoticed from one to three weeks after exposure. There are four main types of lesions (1) a fleeting herpetic lesion (2) an ulcerative lesion, (3) a nodular lesion and (4) a non gonococcal urethritis with a discharge showing only polymorphonuclear leucocytes without organisms. Non venereal and extragenital infections are extremely rare but possible. Soon after the lesion appears or even without previous warning there is a rapid and usually very painful regional adenopathy. These nodes form an indurated usually painful and tender mass which soon becomes adherent to the skin which then appears red and shiny and as the bubo becomes fluctuant the overlying skin becomes necrotic. If not incised multiple fistulous openings establish drainage.

The following classification is used (1) the acute or initial stage (2) the chronic active stage without

rectal stricture and (3) the chronic active latent stage with rectal stricture. There were 10 cases in the first 3 in the second and 7 in the third stage of the disease. The last two groups often showed bubo perirectal abscess, fissures and fistula in ano and elephantiasis of the genitalia. Some cases of urethral stricture may be due to this disease rather than to gonorrhea.

All of the 30 patients had Frei tests and reacted positively to human antigen and the authors accept this test as the final and conclusive step in the diagnosis. The reaction is allergic in character and represents a sensitization to the virus of the disease. Skin sensitivity appears from six to thirteen days after the experimental transmission of the disease to man. Mouse brain antigen has been abandoned because of its unreliability. After forty eight and seventy two hours, positive tests showed a central papule from 7 to 15 mm in diameter often with a central vesicle or necrotic area surrounded by a variable area of erythema usually from 2 to 3 cm in diameter. One case showed a tremendous urticarial reaction of the whole forearm and after forty eight hours a second test showed typical erythema nodosum and multiple swollen and painful joints. Only 1 case gave a false positive reaction that of an asthmatic patient who was sensitive to several other antigens. The diagnostic febrile response to intravenous antigen was not used. The diagnosis of chancroid was not excluded by the intradermal test of Keenstierna. The antigen which killed *D. greyi* bacilli was not available. In 4 of the acute initial cases the incubation period varied from a few days to three weeks. In 1 case the original infection possibly remained latent for years and then flared up with unusual exercise. It appears that the infection can be transmitted at any time during the acute stage. The Frei test was positive once after the eighth day of evident disease. The severe constitutional symptoms of the invasive stage were quite alarming in 2 cases and the sudden improvement following drainage of the bubo was most impressive. A macular erythema was seen in 1 case. In another case the true cause of an intermittent hydrarthrosis was confused by a latent gonococcus infection. In 3 cases of the initial group there was a confusion of lymphogranuloma inguinale with lymphoblastoma and Hodgkin's disease because of the enlarged lymph nodes and spleen.

Four cases of chronic active disease showed a prolonged course without the development of a rectal stricture. In 1 case the disease process had been active for two years, and Frei tests precipitated a typical attack of erythema nodosum and polyarthritides. One was a case of esthiomene without rectal stricture. Two cases presented acute proctitis while 1 presented regional ileitis and involvement of the cecum. Routine Frei tests should be done in all cases of idiopathic gastro intestinal disease particularly in ileitis and ulcerative colitis.

The entire group of 16 patients with chronic active and latent disease had rectal strictures low

in the rectum accompanied by varying degrees of proctitis. The group consisted of 11 men and 5 women. Five of these patients had a bubo, and in 1 the bubo did not develop until the groin was injured several years after the disease was acquired. One case was diagnosed as carcinoma of the rectum. Nine patients had, in addition to strictures, rectal fissures, fistulas, or elephantiasis of the genitalia. The coexistence of any one of these conditions justifies a tentative diagnosis of lymphogranuloma inguinale. In 3 cases the rectal stricture was first discovered during a routine examination. In 2 cases the symptoms suggested intermittent intestinal obstruction. A previous history of gonorrhea was obtained in 6 cases. One patient acquired gonorrhea and lymphogranuloma inguinale simultaneously. Four patients also had syphilis.

Pathologically, the primary lesion shows cellular infiltration of lymphocytes and plasma cells and an altered connective tissue stroma. In the papular stage, necrosis and small abscess formation occur. The affected glands are matted together by extensive periadenitis, and grossly show thickening of the capsule and obliteration of the architecture of the node with a diffuse reddish or grayish surface that may be studded with beginning abscesses. As the process advances the entire intracapsular area may form gelatinous greenish-gray pus. In the earlier stages the essential lesions are pin-point epithelioid formations throughout the gland and an abundance of mononuclear cells. Neutrophilic and eosinophilic polymorphonuclear bodies may be present. The necroses are often star-shaped and walled off by palisades of epithelioid and multinucleated cells, so that differentiation from tuberculosis or syphilis is difficult. In the rectal lesions, the plasma-cell infiltration is particularly marked, whereas abscesses and tuberculoid granulomas are scanty.

The authors do not believe that sodomy plays an important part.

There is no single specific treatment for this disease. If untreated, it runs its natural course with eventual recovery. There are few fatalities reported. In the acute form, bed rest, nursing care, local heat to the bubo, and simple aspiration of the pus are indicated. Radical measures have no advantage. Roentgen-ray therapy to the nodes in doses up to 3,000 roentgen units has been recommended, but in the authors' case so treated, the patient was recovering when treatment was started. Ultraviolet radiation, non-specific protein, intravenous typhoid vaccine, antimony, stibanyl, neostibosan, iodides, methylene blue, copper sulphate, solganol, and "psorimangan," each have their own champions.

Involvement of the lower rectum and the vulva and perineum are the most serious effects of the disease. Once rectal involvement has started, nothing known will stop eventual stricture formation. Sometimes the untreated infection burns itself out and a healed rectal stricture results. In other cases, with fistular complications, recurring abscesses necessitate incision and drainage, heal very slowly, and form granulomas around the anal outlet. Some of these patients respond very well to the use of mineral oil and cathartics, for others, surgical intervention is indicated. The stricture may extend lengthwise for some distance into the rectum or form almost a diaphragm. In the latter type, a simple posterior incision with knife or diathermy, will give immediate relief. Repeated contraction of the rectal scar tissue may require repeated incision. The perianal infection may be so widespread and intractable that colostomy is indicated. The authors have not adopted any radical measures, such as excision of the rectum with or without colostomy.

LOUIS NEUWELT, M D

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

HEMATOGENOUS OSTEOMYELITIS

Collective Review of the Literature from 1932 to 1937

EDWARD T. CROSSAN, M.D., Philadelphia, Pennsylvania

THE survey of the literature on acute hematogenous osteomyelitis from January, 1932, to June, 1937, establishes clearly one fact and it is the only fact established clearly, namely, the disease has a poor prognosis. Slightly more than one fifth of the patients died, nearly two fifths of the survivors were crippled, some of those not crippled were invalids or faced periods of invalidism because of the disease. Fortunately, the disease is uncommon, and it is even said that it is disappearing.

This reviewer gained the distinct impression that many articles published on this disease during the period mentioned were not of the character that increased the sum knowledge of the disease. It is true that the same conclusion might be reached by a survey of literature on any disease, or about any articles on acute hematogenous osteomyelitis during any chosen period. However it did seem that some authors were disposed to the *ex cathedra* attitude some articles were highly dialectic so much so that they threw more heat than light on the subject. Not only was there a great deal of contradiction between authors, but occasionally an author would seem to contradict himself. For instance in one article there is found the opinion that the disease causes as much crippling as tuberculosis of the joints and infantile paralysis, with the warning that there must be immediate bone drainage on location of the point of tenderness yet in the summary these conclusions are noted: (1) 'foci of infection may be come sterile' (2) spontaneous resolution without treatment may occur (3) 'sequestra may not form' and (4) the prognosis is favorable.

Advances in the knowledge of the disease or improvement in treatment will come from cool analysis of cases treated by surgeons in various parts of the world. It is not so important to know the incidence of the disease in the various bones nor is it of especial value to know the sex of the patients, nor the percentages of cases with a history of antecedent trauma. The points which seem to need clarification are these:

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1 The mortality and morbidity figures studied from the viewpoint of days elapsed between the onset of the symptoms and the operation.

2 The mortality and morbidity figures studied from the viewpoint of the severity of the symptoms at the time of operation. Although this topic overlaps the first, it would demonstrate whether early operation in the sick patient is a life saving procedure.

3 The mortality and morbidity figures of the various operative procedures used for drainage.

Reports compiled as suggested or in some better way in due time will force impressions into the background. It is a painstaking task to analyze a series of cases in this manner and the results are not always of great value to the individual student. However, McKeever and Wilson, Pyrah and Pain, Coheur, Wilensky, Robert Crawford, Robertson, Greene and Shannon and some few other surgeons have done it, and they have done it well. When other surgeons join their ranks it is hoped that the percentage of surviving healthy children will increase over the present 40 per cent of the patients afflicted.

Prognosis. Stookey states that in the years 1930, 1931, and 1932 there were reported in the United States 3,160 deaths from the disease. He also notes that 90 per cent of all deaths occurred in the first two weeks of the disease which fact he interprets as being due to a lack of defense mechanism in the host and, quoting further, 'once host has had time to develop immune substances the death rate drops.' In a series of 12 deaths among 50 cases Findlay observed that in the cases in which death occurred the average time between the onset of symptoms and admission to the hospital was 5.8 days.

Various authors speculated on the death rate as being between 10 and 50 per cent. The best results found during this survey were those reported by Humphries: 20 cases without a death. Greene and Shannon had only 1 death in their last 20 cases. Johnston had 1 death in 73 cases. The highest mortality rate was 41 per cent. During this period of review 1,504 cases were reported the

combined report of the various authors, there were 318 deaths in this group, a mortality rate of plus 21 per cent. This figure probably represents the lowest mortality figure for the period between 1932 and 1937, because most of the authors were reporting the good results from a favorite type of therapy. From this group study it was found that of 140 deaths, 82 or 58 per cent occurred after operations performed in the first week of the disease. Greene and Shannon show that the mortality in the very young is high, in a series of 23 patients under six months of age, the death rate was 45 per cent as contrasted to a death rate of 14 per cent in patients between six months and two years of age.

From a series of 51 autopsies following this disease, Pyrah and Pain compiled the following table

	Cases
1. Acute pericarditis	33
2. Acute pleurisy or empyema	12
3. Abscess or infarction of lungs	22
4. Abscess of kidney	18
5. Acute arthritis	9
6. Metastatic abscess	4
7. Abscess in myocardium	7
8. Abscess of spleen	3
9. Abscess of prostate	1
10. No pyemic lesion	10

In discussing the treatment it will be necessary to revert again to the mortality phase of the disease.

From the combined reported statistics during the same period crippling occurred in 39 per cent of the patients. McKeever and Wilson found that 53 per cent of the 85 bone foci of the disease caused growth disturbance. In Johnston's series there was "complete or incomplete" bone growth in 50 bones, or 55 per cent. Greene and Shannon had the best results, 5 deformities in 41 patients, Kuwolski reports "locomotor disturbance" in 30 per cent of his series. The reports on the end-results of cases treated during the acute stage are very few. Some additional end-results will be reviewed under the subject of pyo-arthritis.

There are several notations on prognostic signs. Wilensky believes that "ultimate recovery or death depends on the factor of general infection and the mortality statistics of early acute hematogenous osteomyelitis reflect accurately the mortality of the general infection." In Lebeuf's experience, if the temperature rises to 40° or 41° the patient will die in a few days. Fagge, quoted by Pyrah and Pain, says that the most serious and Kuwolski notes that visceral metastasis is almost invariably fatal. Joyner and Smith use the ratio of the segmented to the non-segmented leucocytes as an index of the severity

of the infection. Fraser gives the following prognostic criteria:

1. A history of previous recurrent skin infections is of serious import because it indicates deficient resistance to the organism.

2. Pronounced general disturbance has an ominous significance.

3. Acute local symptoms are less disturbing, in fact, one may read into them a certain promise as they indicate appreciable resistance to the infectious process.

4. There is a less severe course and a lower mortality in the first three years of life.

5. The nearer the focus to the trunk and the body centers, the more gloomy is the prognosis.

6. Larger metaphyseal areas become serious possibilities because of the area involved.

7. "In my experience every fatal case is due to staphylococcus."

8. A leucocyte count of 20,000 with a polymorphonuclear count of 75 per cent is a favorable augury.

9. The prognosis is improved if the operation is delayed until the focus is reasonably well established.

10. In infections of metaphyses enclosed in synovial membranes, pyo-arthritis is more likely.

Pyo-arthritis. In this review of the literature there were reported 85 cases of pyo-arthritis as a complication of acute hematogenous osteomyelitis, 34 or 28 per cent of the patients died. The diagnosis, according to Greene and Shannon, is suggested when there is resistant flexion deformity, marked muscle spasm, and pain on motion associated with synovial tenderness and distention of the capsule. The complication can be expected in such sites as the upper and lower ends of the femur, and the lower end of the humerus where the metaphyses are partly intra-articular. Pyrah and Pain "found the greatest incidence of joint involvement occurs in cases of acute osteomyelitis at the upper end of the tibia". It occurred in 18 of 62 such cases. On the other hand, Hart denies that infection in the knee is a frequent complication in the disease.

In a series of 51 cases of pyo-arthritis complicating acute hematogenous osteomyelitis, Brisdard's analysis showed that the complication occurred from direct extension in 42 cases and by metastasis in 9 cases. In the series of 51 cases, there was an ankylosis in 65.2 per cent, limitation of motion in 22.6 per cent, and restoration to normalcy, in 13.2 per cent.

Coheur gives these impressions of the complication: (1) in the feeding infant it is benign and does not cause functional impairment, (2) in

older children complete ankylosis often occurs, and (3) localization in the knee is of serious importance

Pyrah and Pain advise early incision and perhaps early amputation. Coheut agrees with the latter counsel. In Robertson's series of 13 immediate incisions the mortality was 23 per cent, and in 7 cases which were observed pre-operatively the mortality was 14 per cent.

The Diagnosis of Acute Hematogenous Osteomyelitis. In addition to the symptoms described in the previous literature are the signs recorded in the five and-one half year survey viz,

1 Hart speaks of lipuma, known as Hedn's sign, as a diagnostic aid

2 From Dillehunt, "if a child under thirteen years is seized with pain in the extremity and he shows loss of function, elevation of temperature and leucocytosis that child has acute osteomyelitis." This statement is much too broad.

3 Quoting Dillehunt, "in acute febrile and painful disorders of the abdomen in children one should remember that the lesion may be somatic and not visceral" and he adds that he has seen several patients with acute osteomyelitis of the pelvic bones upon whom abdominal operations were performed for acute appendicitis."

4 Platt designates the prodromic symptoms as pain over the metaphyses and intermittent limp (quoted by Pyrah and Pain)

5 Greene and Shannon are of the opinion that x rays are of more value in infants than in older children. In addition to the juxta epiphyseal rarefaction one should look for the formation of subperiosteal new bone which occasionally is the first abnormality that can be observed.

6 Halderman says that within from five to seven days the x rays will show rarefaction of cancellous bone near the epiphyseal line and this sign is apparent when the film is compared with a film of the opposite side.

Classification of the Disease. Wilensky divides the disease into 4 groups

1 Disappearing lesions (a) uncomplicated, and (b) with metastasis

2 Cases in which blood infection is a paramount factor

3 Cases in which the general infection becomes controlled and the outcome depends entirely on the local condition or the intercurrent complication (a) fatal cases because of complications and (b) cases in which both factors are controlled and recovery follows

4 Cases in which the general infection becomes controlled and the end result depends entirely on local lesions in the bone

Coheut gives this grouping

1 Septicemic cases in which the patients die in from three to ten days

2 Cases with grave pyemia

3 Benign cases of septic pyemia

4 Localized osteomyelitis with large sequestra

5 Localized osteomyelitis with small sequestra

6 Localized osteomyelitis without sequestra

7 Non suppurating osteomyelitis

Etiology. Stookey accounts for the occurrence of the disease in childhood as being due to a low incidence of immunity against virulent staphylococci. He also believes that, following infection or minor injury, the virulent staphylococci living on the skin as saprophytes may become invasive.

Trauma and infections are frequently mentioned as precipitating factors. Pyrah and Pain in 103 records, found notes in 78 of a history of injury within two weeks of onset of the disease. In the Greene and Shannon series, 17 per cent of the patients had a history of local injury or minor trauma and 55 per cent had a preceding infection and half of the latter were in the respiratory tract. It was also ascertained by Greene and Shannon that in 22 of the 25 cases with a history of preceding respiratory infection the organism found in the pus from the bone was the streptococcus. Coheut found a history of trauma in 15 of 59 cases and in an additional 20 there was preceding infection.

Mein was impressed by the number of cases of appendicitis and osteomyelitis which followed within a year or two after a tonsillectomy. On the other hand, Wakeley believes that acute hematogenous osteomyelitis is on the wane because of tonsillectomy. Humphries has an idea that osteomyelitis "is due to intestinal poisoning which lowers the germicidal qualities of the blood." Fraser adduces an interesting hypothesis for the localization of the disease in the metaphysis. He believes that during the growing period there is "an immense accumulation" of reticulo-endothelial cells in the metaphysis where they are engaged in phagocytic action and in answering the demands of the calcium metabolism. He says further "I believe that in acute osteomyelitis the bone disturbance is but a local evidence of a general infection and the reason why the local lesion is so constantly manifested in the epiphysis is conceivably because we there encounter an accumulation of reticulo-endothelial tissue and that the local suppuration which results from the defensive activities of this area is in some measure protective against the general disturbance."

It is still agreed, judging from the literature of this five-year period, that the staphylococcus is the predominant invading organism. Fraser states that in his experience every fatal case is due to the staphylococcus. Stookey claims that in 90 per cent of the cases of acute hematogenous osteomyelitis the invading organism is staphylococcus; he has succeeded in isolating 27 different strains from these cases, 24 were hemolytic and 22 necrotizing. Greene and Shannon, in acute cases, reported a mortality of 19 per cent from streptococcus, but in staphylococcal infections the mortality was more than twice as high, being 42 per cent. These same authors also point out that it is the staphylococci which produce the chronic form of this disease.

Weaver and Sherwood report a case of acute hematogenous osteomyelitis due to the hog-cholera bacilli. Incidentally, these authors note that this form attacks infants, is milk-borne, and is mild in character. Cases due to pneumococci, and 1 case due to gonococci, are also recorded in the literature.

While we are on the subject of etiology and bacteriology, it is in line to review the subject of blood cultures.

In a series of 12 blood cultures recorded in Mitchell's paper the author noted that 5 were negative and this finding led him to the conclusion that "the bacteremia or septicemia is usually transient," consequently the culture will be positive only near the time of onset of the disease. Fraser agrees that the "germs may be difficult to demonstrate" in the blood. These observations may be explained by Stookey's idea that "the blood in a majority of cases eventually sterilizes itself with the localization of invading bacteria in certain bones" and, to quote further, "if infection is virulent and the body defenses are inadequate multiple bones may be involved with a recurrence of bacteria in the blood." Dolman and Wilensky both observed cases that had positive blood cultures after bone operations for acute osteomyelitis and both authors suggest that the traumatism of operation was the cause for the clinical finding. In a group of 72 positive blood cultures collected in this survey there was a plus 47 per cent mortality; except for Greene and Shannon's figures, there were no records of the organism found in the cultures, and their figures show about the same mortality for the streptococcus and the staphylococcus, but the cases are too few to permit any valid conclusions.

Treatment. In order to simplify the review as much as possible, the survey will be divided into four topics: (1) the time of operation, (2) the type

of operation, (3) the postoperative treatment, and (4) the auxiliary treatment.

Time of operation. The authors are divided into 2 distinct groups: those who would operate immediately, and those who would defer operation. The former group has by far the more numerous adherents. To show how widely the 2 are divided, quotations from various authors are listed.

(For immediate operation)

Conwell: "we see disabilities and deaths as a result of unnecessary delay in treatment," and he adds that authors who have reported a series of cases treated by expectant surgery "have been fortunate."

Owens: "Clinically we know that cases of acute osteomyelitis which have been drained immediately do better than those in which treatment is delayed."

Kuwolski: "there is no proof that direct drainage of the bone in the early stage increases the death rate."

Matthieu points out that delayed treatment is dangerous because of possible joint complications.

Hart advised very early drainage to prevent chronic osteomyelitis but he warns that "one should not expect a dramatic ending of clinical signs and symptoms of the infection following bone drainage."

Conwell, Key, and Rankin state that they would rather open a bone and find nothing than to miss a case of acute osteomyelitis.

Cotton advised, "in case of doubt open, open wide"

Very many authors advise early and immediate drainage without giving any particular reason except to intimate that early operation will prevent a spread of the disease through the bone.

Robertson: "Majority of best results are obtained if operated on within one week of onset" but he admits "the mortality rate is also highest in this period."

(For deferred treatment)

McKeever and Wilson: "blood-borne infection of bone may be more successfully handled by adhering to the principle of allowing the infection to localize."

Greene and Shannon: "in many instances in our series we deliberately waited until the abscess localized"

Lebeuf: "... in spite of early and extensive trephine there were as many deaths and pyoarthroses", he adds that early operation may spread the disease

Fraser: "Is it right that we should regard the local focus as a most regrettable and deplor-

able manifestation. There is such a thing as a fixation abscess when it appears it is regarded as a providential occurrence for it is Nature's method of providing a defensive area from which factors of immunity are organized and developed. From what I have seen of acute osteomyelitis the impression is growing that the focus in the bone can only be regarded as defensive in its action and salutary in its effect.

Greene and Shannon "those operated upon after a relatively long interval did as well as those operated upon early as both regards the immediate and final result."

Greene and Shannon "Evidence suggests that waiting for localization should do little harm. This is of great aid because it permits time for accurate diagnosis and prevents unnecessary operations on a sick child."

Lombard advises waiting till the period of septicemia ends.

Ladd says that operation should not be done when the disease is in a fulminating stage.

Wilensky "paramount issue in treatment infers that general infection was derived from local bone lesion inference is incorrect."

So much for the opinion of surgeons in the opposing group. A reviewer must be impressed by the fact that opponents of the early operation attempt to buttress their arguments by statistical studies, if these gentlemen have not proved that deferred operation is ideal they have shown that the early operation is not ideal.

In this review there were collected records of 108 patients operated on in the first week of the disease. Thirty-one of this number or 28.7 per cent died, this is a higher figure than the average mortality figure for the entire series but it proves nothing because there are no figures for the succeeding weeks of the reported cases.

Type of operation. For very many years guttering was considered the only operation for acute osteomyelitis. Within the past generation diaphysectomy has had its introduction and within the past few years its domination. Since Starr's article in 1922, drilling or "opening a window in the bone" has become the accepted method.

Key still advocates the guttering operation, and he performs the operation without a tourniquet to avoid "traumatism to the soft tissue" yet he does note that the "operation should be as simple as possible." In England there are more surgeons who advise this type of operation than in America, that is if one can judge by the literature. Kuwolski gives as his opinion "the affected portion of the bone should be removed no matter

at what stage of the disease it is encountered at operation." Pyrah and Pain show that in their series, guttering caused the highest death rate and they believe that this operation increases absorption of the toxins. Petersen agrees with this opinion and explains it on the basis of the opening of the blood sinusoid to toxins and bacteria.

As noted previously most of the authors advise drilling by the method prescribed by Starr, and these same authors, almost all of them, advocate early operation. Many of these same reporters advise drilling of the bone even though pus is found beneath the periosteum a few, who favor drilling, limit the operative procedure to incision in cases in which there is a subperiosteal abscess present.

A few surgeons believe that in nearly all of the cases the operative procedure can be limited to incision of the soft parts. Williams says that even the widest opening of bone will not be efficient drainage. Coheur believes that any opening in the bone is not as efficient as the multiple opening from the Ilizarovian canals.

Diaphysectomy is condemned by most of the reports because of the deformity which follows, a deformity due to failure of the bone to regenerate. Lepuyre and Cabanac claim that if the operation is done early there is a rapid defervescence and an absence of the late complications. While Petersen condemns the method, he thinks it is suitable for acute osteomyelitis of the fibula. Hart advocates this method in the same cases. The lowest mortality figures reported by Pyrah and Pain were those from a group of cases treated by diaphysectomy, "20 cases with 1 death" however, there was "considerable deformity in 6 cases" and in 2 additional cases a subsequent amputation was necessary.

A review of the articles regarding the time and type of operation show that treatment is based on two different viewpoints. The adherents of early operation who as a rule, believe also in burre drainage are of the opinion that the disease arises in the bone and that the systemic symptoms are due to absorption of toxins from the confined pus. The other group, who counsel deferred treatment, argue that the bone condition is an incident in the general blood stream infection. The first group considers urgent operation necessary while the second group believes an early operation may spread the infection. There is nothing in the literature to answer the dispute, but, as noted once before those who argue against early bone operation give figures to show that this operation has not done what it is claimed to do namely, lower the mortality rate and decrease crippling.

In this five and-one-half-year survey the type of operation and the mortality were noted in 775 cases. Of these cases, 220 were treated by incisions, and in two reports it was mentioned that some of the cases were so treated because the patients were very ill; there were 31 deaths, a mortality rate of 14 per cent. In the remainder, 555 patients, the bone was drained and 118 or 21 per cent died. So it can be inferred from these figures, that incision alone did not increase the death rate.

Postoperative care. Orr's method of treatment of the wound has been widely accepted throughout the world. Recently from Germany there has come a new wound treatment, called the Loehr method, it consists of packing the wound with cod-liver oil or cod-liver-oil paste, the vitamins of the oil are said to have some local effect on the wound healing. Fraser packs the wound with gauze soaked in liquid paraffine, acriflavine, and 2 per cent sodium citrate, the citrate keeps the discharge in solution, the acriflavine is an antiseptic, and the paraffine permits easy removal of the pack. Hawk uses a packing of 1 part glycerine and 2 parts magnesium sulphate. Waugh uses packs with a definite acid character because the "acidity hastens separation of sequestrum." Dolman is opposed to any method of wound treatment that seals up the discharge. Stewart objects to the Orr method because there is, so he says, a resultant mass of scar tissue.

As a substitute for maggots, Stewart advocates the use of calcium carbonate supplemented by picric acid and glycerine. He admits that when there is much debris in the wound, maggots are preferable. The purpose of the calcium carbonate is to stimulate inert phagocytosis, and the picric acid is believed to render insoluble the leucocidin excreted by the bacteria. Following operation the wound is packed with vaseline gauze for twenty-four hours "to allow the trauma to subside somewhat." At the first dressing the wound is thoroughly irrigated by means of a syringe with 0.25 saturated aqueous solution of picric acid with 8 per cent glycerine, the solution is not removed. A few seconds later an autoclaved aqueous solution of calcium carbonate, 20 gm. of calcium carbonate to 215 c. m. of distilled water, is sprayed into the wound with an atomizer. In severe acute cases the treatment is given daily "for a week or two," otherwise it is used three times a week.

For this treatment the author claims the following advantages.

1. It maintains an alkaline or neutral reaction in the wound, thereby it prevents swelling of the cells and autolysis of the protoplasm seen in acid

wounds (Waugh says the wound secretion is alkaline and he attempts by certain packs to make it acid.)

2. The calcium picrate has anesthetic properties.

3. The healing period was shorter than in the series reported by Kuwolski with Orr's method.

4. The treatment is simple, there is less scar tissue and immobilization is not required.

As compared to maggots, the author says this method is cheaper, less disgusting to the patient, without danger of introduced contamination, and it can be used in cases in which there is excessive drainage. The treatment is based on the author's experiments which showed that in maggot treatment calcium was excreted by the bodies of the bacteria, which substance, the author says quoting Beckhold, stimulates phagocytosis. The author reports 44 cases, but few of these, if any, were true cases of acute hematogenous osteomyelitis.

Albee recommends the use of bacteriophage supplemented by a wound-packing mixture of vaseline and paraffine. In discussing bacteriophage, Stewart says that the bacteriophage may be adsorbed or rendered inert by serum, and, furthermore, bacteriophage introduced into the body is eliminated in from twenty-four to forty-eight hours. Bagley and Kelly used bacteriophage intravenously without striking results.

Therefore, surgeons have proposed as postoperative treatments, the Orr method, cod-liver oil, picric-calcium carbonate, maggots, magnesium sulphate with glycerol, bacteriophage, and acriflavine with sodium citrate. It seems that any method that tampers not too much works well.

Auxiliary methods. Humphries argues that operation is not necessary in acute hematogenous osteomyelitis. By means of a liquid diet and immobilization he obtained 20 recoveries with no deaths. As mentioned previously this author believes that intestinal putrefaction is the disturbing agent in the disease.

On the theory that neosalvarsan destroys or inhibits the growth of the staphylococcus, Le Cocq administers the drug in from .15 to .45 mgm. doses every three days. He reports he treated 13 cases with 3 deaths, and in a control group, in which the drug was not used, there were 7 cases and 6 deaths. The mortality figures with the use of the drug are not as low as the average mortality figures in the literature.

Antitoxin is mentioned in a few papers. Fraser says that he has been disappointed with the treatment. Joyner and Smith report a group of 15 cases so treated and contrast this to a group of 24

cases which did not receive antitoxin, in the former there was a mortality rate of 13 per cent, and in the other group the rate was nearly three times as high, 37.5 per cent. The dosage used by these authors varied with the severity of the disease and with the ratio of the segmented to the non-segmented leucocytes, in the group treated the total amount used varied between 32,000 P international units and 160,000 P international units. Joyner and Smith make this observation about the antitoxin: 'the antitoxin is not directly bactericidal but has an indirect bactericidal effect by neutralizing the circulating toxin and thus removing the inhibition of the normal phagocytic activity of the leucocytes.'

Dolman recommends the use of toxoid as well as antitoxin the antitoxin during the early stage and the toxoid during convalescence. This author claims that the antitoxin is primarily antitoxic, indirectly bactericidal and definitely anti-leucocidal. His recommended dosage is the daily intramuscular injections of 60 c cm until symptoms improve or the culture is sterile, then daily doses of 30 c cm until three successive sterile cultures are obtained. Dolman and Kitching and Joyner and Smith also, warn against the intravenous use of the antitoxin because of the hyperpyrexia which ensues. During convalescence toxoid in saline is given subcutaneously every five to seven days starting with a dose of 0.05 c cm and working up to 2 c cm. A second course of from 4 to 6 injections is given after a month or two. The authors aver that the treatment increases the circulating antitoxin from 5 to 10 fold. Dolman, as well as Joyner and Smith use this treatment as an auxiliary of bone drainage.

Hudson, two weeks after operation puts the whole body without dressings to the wound in running tapwater of 110 F. The treatment is repeated daily. He reports 'satisfactory results.'

Gray has abandoned operation and for five years has treated the patients with mercuric perchloride in doses of from 1/40 to 1/10 gm given intravenously every day or every other day. He reports only 1 death but he does not give the number of cases treated. Fraser stated that he had abandoned the use of the drug.

Benians recommends the use of benzol by mouth to decrease the number of leucocytes. The drug is given in 10 min t i d until the white count falls to 10,000. He reports 4 cases without a death. In regard to this treatment it is interesting to note that Fraser considered the prognosis good when the leucocyte count was above 20,000.

Many of the papers reviewed recommend the use of transfusions. From some of the papers the

reviewer got the idea that the author in recommending the treatment, was just tacking some thing on, much the same as one uses 'etc.'

Stookey says that "beneficial effects—by transfusion of blood from an adult donor may be due in part to the titre of staphylococcus antitoxin consistently present in the blood serum of the adult. Key recommends repeated small transfusions, from 100 to 300 c cm, every other day. Bazin says that transfusions are of great value.

Now, I know not ' he advocates the removal of 500 c cm of blood, citration, and the administration of one half one day and the rest on the following day. There are no quoted statistics as to the number of transfusions used. What effect they had on the progress of the disease or whether there was any decline in the fever. There are very few references to immune transfusions, Coheer noted that 1 patient had 3 without any result.

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CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Rakov, A. I.. Malignant Rhabdomyoblastomas of the Skeletal Musculature. *Am J Cancer*, 1937, 30. 455

Although the cells found in rhabdomyoblastomas are mostly elongated and spindle-shaped, there may be a great variety of other types. Giant cells are always present, varying greatly in size and number. There may be so much degenerated tissue that the real structure is obscured.

The spindle cells may be 100 microns or more in length, sometimes bifurcated at one end. The nucleus may be a large single one or multiple. Some of the polymorphous cells are 7 or 8 microns in diameter, others as much as 30 microns, they are round, oval, or polygonal. The giant cells are also variable, a small type, the ordinary tumor giant cells, is from 30 to 60 microns in diameter, and a large type, from 150 to 200 microns in length, is spindle-shaped with fantastically shaped hyperchromatic nuclei. A third type is really a plasmodium, enormous in size, multinuclear, and containing delicate fibrils, vacuoles, and canals.

The most important histological feature of these tumors is their fibrils. They are long, thin, and black, extending the full length of the cell and sometimes connecting with the cytoplasm of an adjacent cell. Fine granular material which seems to be the remains of striated muscle tissue is often found in these tumors. Stroma is not prominent, but when found its most distinctive characteristic is the presence of sheaths around every cell, which may be the prototype of the sarcolemma of mature striated muscle.

Reports of malignant tumors of striated muscle have been few, but this does not necessarily mean that their occurrence is rare. At the Oncological Institute in Leningrad, 20 per cent of the soft-tissue sarcomas seen in a period of eight years were malignant rhabdomyoblastomas. No definite age group or sex predilection was noted in the patients. The

muscles of the lower extremities, chiefly the quadriceps, abductors, and semimembranosus, are the most frequent sites of these tumors. The tumors are usually round or oval, circumscribed, movable, but not painful. They may be 20 cm in their greatest diameter. They grow rather rapidly and, if in the periphery of a muscle, spread along the intermuscular septa. The immature type grows more rapidly and may ulcerate. The mature type grows more slowly and may persist several years without metastases. The mortality is much higher in the immature than in the mature type.

Metastases have been found in the lungs, ribs, skull, sternum, pancreas, ovary, and elsewhere. A striking feature is local recurrence which may occur from a few weeks to several years after excision. In one case a tumor of the upper arm muscles was excised 13 times and recurred after each excision.

In diagnosis, a well outlined solid tumor, which is deep in a muscle and moves with it, which has grown rapidly and painlessly, and which is covered with skin that is normal except perhaps for a network of dilated veins, may be presumed to be a rhabdomyoblastoma. Differentiation must be made from neurogenic sarcoma, lipoma, fibroma, gumma, echinococcus cyst, and inflammatory lesions. On clinical examination these tumors are often taken for fibromas or fibrosarcomas. Histological examination with special stains is usually necessary for a conclusive diagnosis.

Treatment should be radical, wide excision through normal tissue. The tumor must not be merely removed from its bed. The electro-cautery is preferable to the knife for excision although it does not guarantee against recurrence. If the tumor is near a joint, amputation or disarticulation should be done.

WILLIAM ARTHUR CLARK, M D

Matthes, S.: Tennis Elbow (Der Tennisellenbogen). *Arch f orthop Chir*, 1937, 37: 641.

The conceptions concerning the characteristics, cause, and development of tennis elbow are often contradictory. The clinical picture is often desig-

nated as 'epicondylitis'. Tennis elbow should not be confused with 'tennis arm,' by which is understood a painful arm, especially after playing tennis, which clearly indicates a hypertrophy of the muscles of the playing arm and may develop simultaneously with a tennis elbow. The clinical findings of tennis elbow are:

1 Tenderness to pressure of the anterior portion of the capsule is present, especially over the radio humeral joint.

2 There is a spontaneous production of pain at the site of pain previously demonstrated by palpation when the subject attempts to elevate the extended arm.

3 The final phases of extension are particularly painful.

4 Motion in the range of flexion as well as supination and pronation are painless up to the onset of painful extension. A mild limitation of extension often exists.

On the basis of the clinical findings the condition is considered a lesion of the volar portion of the capsule. After a longer period calcific and bony deposits at the site of pain are seen in the roentgenogram. Short wave therapy brings substantial improvement in all cases and healing in a few. A retirement from the sport for from three to four weeks is always necessary. (BODE) JEROME G. FENDER M.D.

Odesky I. A. The Koehler Pellegrini Stieda Syndrome (Le Syndrome Koehler Pellegrini Stieda) *Lyon chir* 1937 34 272

In 1905 Koehler called attention to a diffuse ossification of the periarticular tissue around the hip. About the same time Pellegrini described a similar condition which he observed on the inner aspect of the knee after trauma. These publications did not attract much attention but two years later after Stieda wrote on the same subject others began to notice the lesion. From 1931 to 1934 there have been numerous papers on this subject most of them in France and Italy.

Many cases of injury to the knee joint are considered sprains or contusions if the roentgenogram is negative. If symptoms continue for a longer time than expected subsequent roentgenograms may show a formation of callus on the mesial aspect of the joint parallel to the femoral condyle. Usually this shadow is separated from the bone by a clear space. It is variable in density and shape but usually it is sickle shaped conforming to the outline of the joint capsule. There may be a dense nucleus of calcification in the middle of the shadow.

The clinical symptoms are indefinite pain on the mesial part of the knee, limited motion and edema. In no case has there been complete disability.

Twelve cases are reported by the author. In each of them there was a history of trauma. In 1 case the shadow persisted after ten years; in another it had persisted 19 years; in another five years.

Regarding the anatomical significance of the formation Stieda thinks it comes from a slight

fracture of the upper part of the femoral condyle. Vogel arrived at the same conclusion after operating on a case and finding only bony callus without trace of periosteum in the growth. However no roentgen area could be found on the condyle where such an avulsion fracture might have occurred. Some consider that there is an ossification of detached periosteum. Pellegrini rejects the theory of fracture and believes that there is a metaplasia of connective tissue. A piece which he removed about the size of a pigeon egg showed a gradual transition from connective tissue to osseous tissue and cartilage without evidence of avulsion from the bone. Temler regards it as ossification of a hematoma in a region where chances of absorption are poor. Most American writers regard it as a metaplasia of connective tissue.

In the author's opinion, the idea of a fracture is untenable because the roentgenogram taken immediately after the injury does not show a fracture. A similar shadow has been observed at the elbow and at the ankle in the latter case concomitant with a fresh fracture of the fibula. The theory of ossification of attached periosteum does not seem well supported because there is no connection between the shadow and the bone. The theory that interstitial hemorrhage forms a hematoma which subsequently ossifies seems to be the most reasonable although the author has not had an opportunity to verify it by operation. It is the concern of opinion that operation in these cases is contra-indicated because of the danger of the production of still more callus due to the operative trauma. Cases of Schuller and Weil, Kopylov and others show histological evidence in support of this theory in that they presented ossification which took place in the neighborhood of a tendon far removed from bone and periosteum.

In conclusion it is not considered logical to call this condition a disease rather it should be called a syndrome or a process. Also it should be recognized that the syndrome may be noted at other joints than at the knee. (WILLIAM ARTHUR CLARK, M.D.)

Gorzawski H. A Contribution to the Etiology and Pathogenesis of Patella Partita. Especially in its Relation to the Aseptic Necroses (Beitrag zur Aetologie und Pathogenese der Patella partita insbesondere ihre Beziehungen zu den aseptischen Nekrosen) *Arch f Klin Chir* 193 188 553

The author describes the treatment of a ten year old girl who had disturbances in walking, pains in the knees and several anomalies. According to Saupé the forms of patellar division are differentiated into 3 types: (1) the transverse division with a large upper and a smaller lower segment (2) a division along the sagittal line into a large medial and a small lateral segment and (3) an oblique division into a large distal medial and a small proximal lateral segment with a further breaking up of the latter into one or more parts. According to Laas, Haerich, Schwarz and the author this classification may be enlarged

by a fourth type, i.e., a vertical separation in the frontal line with a larger segment anterior and a smaller segment posterior

Among the causes of these conditions are osteochondritis dissecans, aseptic necroses, disturbances of ossification, combinations of manifold disturbances based upon constitutional anomalies or occupational or habitual traumatism. Endogenous and exogenous factors are causative inasmuch as diminished resistance favors serious structural and physiological changes. In addition to minor skeletal and connective tissue weaknesses, aberrations of the nervous system are also of importance. These factors justify the belief in an inherited weakness or dyscrasia and the possibility of a familial occurrence of these conditions, as was observed and mentioned in the literature

(HEINEMANN-GRUDER) MATTHIAS J SEIFERT, M D

Bruce, J.: Structural Anomalies of the Forefoot in Relation to Some Metatarsal Disturbances. *Edinburgh M J*, 1937, 44 530

The author believes that an easily recognizable structural abnormality of the first metatarsal bone is common to that group of forefoot disturbances which includes metatarsalgia, march fracture, and Deuschlaender's and Koehler's diseases. The evolutionary development of the foot in primates requires changes from the pronograde or prehensile, to the human foot. The former has a short tarsal segment articulating with a relatively short, widely abducted and freely movable hallux segment, and a relatively long and unimportant digital segment, the long axis of the foot passes through the third metatarsal bone. An intermediate stage is the orthograde foot, which approaches the "humanoid" by transference of the long axis between the first and second metatarsals, the outer metatarsals are apparently reduced in size. Finally, the human foot is evolved by adduction of the first metatarsal, decrease in length of the outer metatarsals, and hypertrophy and fixation of the first metatarsal, which reduces its primitive mobility.

Anomalies which result from developmental failure to attain the final form place the forefoot at a disadvantage during foot activity. The middle three metatarsal heads are forced to assume a weight-bearing rôle for which they are not normally adapted. However, efficient compensation by forefoot muscle tone and thickening of the shafts of the overloaded metatarsals may successfully mask the developmental weakness. When compensation fails metatarsal diseases arise. Metatarsalgia of neuralgic origin, or Morton's disease, occurred in 4 of 53 cases. In the remaining 49 cases of metatarsalgia, there was primary alteration of the metatarsus in 28, and well-marked flatfoot with metatarsus primus varus in 20. Hallux valgus may be due primarily to varus deformity of the metatarsal, footwear is secondary.

Marching foot and Deuschlaender's disease are identical except that fractures are absent in the latter. These conditions are considered an expression



Fig 1 Radiogram of Koehler's disease of the third, and march fracture of the second metatarsals

of weakness of the anterior part of the foot, the symptoms may be caused by tenosynovitis, metatarsal periostitis, or muscular strain. In 12 cases the author found 3 instances of first metatarsal shortening, in 9, marked hypermobility, and in 8, metatarsus varus. Bone changes are explained as being due to failure of osseous compensation. The second and third metatarsal shafts are thin and tend to bend under walking stress, bending may lead to subperiosteal hemorrhage and new bone formation or, if excessive, to fracture.

Koehler's disease, or Freiberg's infraction, is neither specifically an epiphyseal disease, nor the result of a trauma sufficient to produce fracture. The lesion has been demonstrated in its earliest phases at an age when the epiphysis was already closed. Trauma is conspicuously absent from clinical histories. The author believes that the lesion is closely allied to the foregoing groups. Thirty-four cases were reviewed: the first metatarsus was short in 15 cases, in well marked varus deformity in 20, and hypermobile in 14. The association with metatarsalgia and marching fracture is not uncommon.

JEROME G FINDEP, M D

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Orell, S: Transplantation of Bone (La transplantation osseuse). *J de chir*, Par, 1937, 49 857

This is a discussion of the use of prepared bone implants and a presentation of cases

The technique of the bone graft has been influenced by two opposed schools of thought. Ollier believed that bone when transplanted with its periosteum intact was capable of surviving and he developed his technique accordingly. Arzhausen, Lexer and more recently Albee worked along the same lines. Barth and his followers held the contrary view, namely that a bone graft always dies. These authors, recognizing the utility of a transplant, believed that dead bone preserved by various methods could serve quite as well as an autogenous graft and moreover possessed certain mechanical advantages.

More recently the importance of the connective tissues to osteogenesis has been recognized; the connective tissues immediately associated with bone have an especial aptitude for the creation of new osseous tissue. This explains the notable success of osteoperiosteal grafts in spite of the fact that the bone itself undergoes necrosis.

Implants which have been preserved in alcohol are inadequate because the connective tissue of the implant is unable to participate in the regenerative process and because the cells of the host can penetrate it only very slowly. To overcome the disadvantages of the usual dead bone implant, a special preparation has been developed. The bone is freed of all fat and connective tissue so that the haversian system is open to the ready invasion by the cells of the host. In practice new bone appears by the second week, but for complete replacement of the implant two or three years are required.

Ten radiograms illustrate the results in a variety of conditions following the use of this os purum. The author finds it more satisfactory than the autoplasmic graft.

ALBERT F. DE GROOT, M.D.

Sorrel E. Congenital Coxa Vara. Cuneiform Resection of the Cervicodiaphyseal Angle and the Replacement of the Resected Corner in Reversed Position. Excellent Result (Coxa vara congénitale. Résection cunéiforme de l'angle cervicodiaphysaire. Remise en place après retournement du coin réséqué. Excellent résultat). *Mém. Acad. de chir. Par.* 1937 63 739.

The cause of congenital coxa vara is unknown. There are several theories. However it is not the question of cause which interests us; rather it is the best form of treatment.

Some time ago the author tried an original operative treatment.

The patient was a girl seven and one half years old. A limp which was noticed when she first began to walk had increased gradually from year to year. There was no pain but a feeling of fatigue came on after long walks or similar exercise. There was no external rotation of the thigh as in rachitic coxa vara and she could sit down and kneel down normally. Except for slight limitation of internal rotation motion in the hip was normal. Apparent shortening of the leg was 6 or 7 cm. but actual shortening was about 3 cm. The roentgenogram showed that the angle between the neck and shaft of the femur was



Fig. 1. Osteotomy of the great trochanter. Cuneiform cervicodiaphyseal osteotomy. Replacement of the resected corner.

only 80° while the angle of the normal hip was 120°. The epiphyseal line was almost perpendicular and the bone adjacent to the epiphyseal cartilage was unusually dense. Spicules of bone penetrated the cartilage which caused the appearance of early ossification. In some of the more severe cases of coxa vara fusion of the epiphysis and diaphysis never occurs and with weight bearing a pseudarthrosis supervenes.

In the surgical treatment of these cases the problem is not only one of correction of the deformity but also of the prevention of recurrence. Skeletal traction may correct the angle but cannot prevent a recurrence. Osteotomies, whether transverse, curved cuneiform or modeling will serve only for correction.

With a view of prevention as well as correction, Tavernier and Pouzet have devised an operation which includes resection of the pathological area of the neck and of the epiphyseal cartilage. The result was good in one of two cases.

In October 1936 the author first performed an operation which consisted of a cuneiform osteotomy with replacement of the resected wedge in a reversed position as illustrated in the accompanying figure. The shape and dimensions of the wedge were first determined by study of a pattern made from the roentgenogram. Geometrically the angle included by the two sides of the resected wedge should be half of the difference between the coxa vara angle and the cervicodiaphyseal angle of the normal side. For example in the above case the angle was the difference between 120° and 80° or 40° and the wedge, therefore included an angle of 20°.

The approach was made through a long incision parallel with the anterior border of the great trochanter. The great trochanter, the neck and the upper part of the shaft were completely exposed. A wedge of bone its point downward and inward was then resected from the base of the neck and the great trochanter. The shaft thus freed was widely abducted and the wedge of bone reinserted reversed, i.e. its point placed upward and outward, in which position it maintained the abduction. A plaster cast was then applied and kept on four months.

The patient was operated upon in October and began to walk the following April. She now walks

without any limp, the pelvis is horizontal, the legs appear to be the same length and there is less than 1 cm actual shortening. The Trendelenburg sign, which was positive before the operation, is now negative. Roentgen rays show the wedge of bone united to the shaft and the neck in good position. The cervical diaphyseal angle is now 120° , the same as that of the other hip, while before the operation it was 80° . The neck is short and thick but the trochanter extends laterally sufficiently to furnish good leverage for the gluteal muscles.

WILLIAM ARTHUR CLARK, M D

Scholder, C : Tuberculous Osteo-Arthritis of the Lower Extremity — Orthopedic Treatment (Osteo-arthritis tuberculeuses du membre inférieur—traitements orthopédiques) *Rev d'orthop*, 1937, 24 297

Scholder gives in detail the case history and orthopedic treatment of 6 patients, ranging in age from fifteen months to fifty-seven years. Photographs illustrate the type of apparatus used in each case and demonstrate the roentgenographic findings. One of the patients was suffering from tuberculosis of the hip, 2 from involvement of the knee, and 3 from tuberculosis situated in the small bones of the foot.

The essentials of treatment by conservative means are (1) prevention of all articular movement, (2) the avoidance of breakdown of the joint by the weight of the body, and (3) counter-extension to overcome compression caused by periarticular muscle tonus. Most splints meet these requirements poorly and at the same time prevent exposure of the limb to light and air. Extension with the patient in bed has the great disadvantage of incapacitating the subject for a long period of time. Bed rest, however, is essential in the early stages of treatment particularly in the child in whom further dissemination of the infection is to be feared. As soon, however, as the general condition of the patient is improved and the local lesion becomes less active and painful, bed treatment should be abandoned in favor of suitable ambulant orthopedic measures.

In the treatment of tuberculosis of the hip it is best to immobilize both the hip and the knee. As the hip heals, more and more movement may be allowed at the knee. More extension than that provided by the weight of the limb itself may be necessary occasionally. This is true also in lesions of the knee and foot, but need for pull is less the lower the lesion, because of the decrease of the overlying muscle tissue.

With the use of the apparatus described, little discomfort is felt by the patient when he is becoming accustomed to walking. Muscular atrophy is entirely absent or reduced to a slight degree. The slight stasis of circulation exerts a beneficial effect upon the lesions, as in Bier's hyperemia. The cost is reduced by the fewer days spent in the hospital or sanatorium. The patient may walk about and be able to engage in his usual occupation, which

factors aid the cure by their favorable psychic effect and by permitting financial independence.

MARSH W POOLE, M D

FRACTURES AND DISLOCATIONS

Jung, A : Three Cases of Fracture of the Elbow and of the Knee Treated by Novocain Infiltration and Immediate Mobilization (Trois cas de fracture du coude et du genou traités par infiltrations novocaïniques et mobilisation immédiate) *Rev de chir*, Paris, 1937, 56 450

Jung reports 3 cases showing the advantages of novocain infiltration and immediate mobilization in the treatment of epiphyseal fracture without marked displacement, which method has recently been adopted at Leriche's clinic at Strasbourg, France. The method consists of blocking the vasomotor reflexes originating at the site of the fracture and thus suppressing the functional difficulty, pain, and hyperemic swelling.

In the case of a woman forty-eight years of age, who sustained a supracondylar fracture of the lower end of the humerus from a fall on the elbow, the arm was placed in a grooved plaster splint. The splint was removed every other day, the joint and its ligaments were infiltrated with a 1 per cent scurocaine



Fig 1. Fracture of the olecranon. Radiogram immediately after the accident (Case 2)



Fig. 2 Radiogram three months after accident (Case 2), showing the degree of flexion obtained and the progress of union of the fracture

solution and the elbow was flexed and extended passively. After the eighth day the patient could move the elbow after each infiltration but the arm was kept in a sling between treatments; after the second week novocain infiltrations were given two or three times a week and by the sixth week the sling was discarded entirely and the function of the joint was excellent. The patient was able to use her arm more and more and regained normal painless function in the following months.

In the second case that of a woman fifty eight years of age who sustained a transverse fracture of the olecranon from a fall on the elbow there was considerable displacement of the fragments. Infiltration with novocain made active movement of the elbow possible from the first, after the third treatment the patient used her arm to some extent and by the sixteenth day the function of the arm was normal. The separation of the fragments still persisted to some extent but later there was good callous formation.

In the third case a woman fifty nine years of age had a vertical fracture of the external condyle of the tibia which resulted from a fall on the knee. The first infiltration of scurocaine was made into the ligaments and capsule of the joint on the third day after the fracture; after the third injection the patient could move the knee normally. The sixth day after the accident she could walk with only a slight limp to avoid putting full weight on the injured knee and a few days later walked normally. Roentgenological examination on the eleventh day showed rapid healing of the fracture. In this case as in Case 2 the novocain infiltrations appeared to favor formation of the bony callus. The final result was excellent with entirely normal function of the

knee. The injury had not been of a severe type and recovery of function was unusually rapid.

ALICE W. MEYER

Cone W. and Turner W. G. The Treatment of Fracture Dislocations of the Cervical Vertebrae by Skeletal Traction and Fusion. *J Bone & Jnt* 1 Surg. 1937 19 54

The cervical spine is particularly vulnerable to injury because of the weight of the head and the mobility of the cervical vertebrae. When tense the neck muscles with the powerful ligaments provide considerable protection, but when the muscle defense is relaxed the unexpected application of even a slight force may cause severe injury.

Indirect violence of various types is the usual cause of serious injury and at times produces extreme deformity. Fracture dislocations which are easily produced are also readily reduced by prompt and appropriate treatment. Reduction can be maintained by plaster and other supporting jackets but recurrence of the deformity may develop shortly after the support is removed or the deformity may gradually increase over a period of years unless more energetic therapy is provided.

The vulnerability of the spinal cord makes the recurring deformities of grave significance. Immediate death due to respiratory paralysis is not infrequent when the deformity recurs suddenly in the upper cervical region.

In the past four years there have been under the authors' care 36 patients with injuries of the cervical vertebral column and in 12 of these the skeletal muscular and ligamentous involvement was such that operative intervention and fusion were carried out.

The authors present 6 case reports to show the satisfactory end results obtained by fusion.

A rather rigid routine is followed in handling a patient studying the acute injuries after admission to the hospital. Neurological and general physical examinations are just as complete as the patient's condition will permit. In many instances much of the examination has been carried out in the roentgen ray room in the intervals between roentgen exposures and the development of the films. The patient is not moved from the bed for roentgenographic studies. If roentgenograms have shown a deformity and a subarachnoid block is present, skeletal traction is applied with the patient in bed. Either tongs or heavy rustless steel wire passed through small openings in the skull with a trephine or a Hudson burr are used to obtain traction. Once the traction has reduced the deformity and relieved the block, the safety of the spinal cord is assured as long as the proper angle of traction is continued. The apparatus described has permitted lateral movements of the traction pulley on the cross bar and allows the patient to be turned safely for care of the back and dressings.

The authors emphasize three points in the surgical technique of the fusions.

1 Traction is maintained during operation. Reduction has taken place on the operating table because of the traction alone without any manipulation other than that of rongeur away bone which had fixed the facets

2 As the exposures must be obtained by the gentlest means possible, dissection and baring of the spines, laminae, and articular facets is done with the electrosurgical unit. The use of periosteal elevators is avoided as much as possible. This method has completely denuded the bone and prepared a bed for the grafts. Hemorrhage is minimal

3. The authors used Babcock's rustless steel to tie the grafts in place and to close the muscles in layers over them. This suture material is easily handled, it is positively sterilized by boiling, and it has been found by animal experimentation that it causes less tissue reaction than catgut or even silk. It stays tied

The bone grafts are taken either from a rib, tibia, or an ilium. Parallel grafts are used in all cases. Articular facets above and below the lesion have frequently been curetted

As soon as the wound permits, plaster fixation of the head, neck, and torso is applied and the skeletal traction is removed. It is wise to have these patients up as soon as their motor power is adequate and they have become accustomed to the plaster fixation as they are much happier and their general health is better. The plaster immobilization should be maintained for six months. NORMAN C. BULLOCK, M.D.

Smith, A. R. : The Shelving Operation in the Treatment of Neglected or Irreducible Congenital Dislocated Hip. *Ann Surg* 1937, 106 92

A critical analysis has been made of a total of 69 non-operative and operative cases. The symptoms were classified as (1) objective, namely, limp, shortening, scoliosis, and lordosis, and (2) subjective, pain, fatigue, and stiffness

The analysis suggested that a child with a unilateral dislocation of the hip would most likely reach the age of fifteen without complaint other than a limp and an unsightly gait. From the fifteenth to the thirtieth years the probabilities are that the patient would develop pain or fatigue, and patients over thirty years of age are almost certain to develop pain, the time and degree of development depending on the amount of arthritis present

In the cases with bilateral dislocation, the patients would probably reach only the tenth year before the development of symptoms due to their abnormal gait. By the time they had reached their twentieth year they would almost certainly present pain and fatigue symptoms

The prognosis of cases in which the shelving operation is performed is apparently good when an adequate shelf is built. This type of operation has been found to ameliorate pain, fatigue, limp, and stiffness a great deal, especially in older children with unilateral dislocation. Cases of this type were followed for at least nine years

The shelf operation showed poor results in the younger groups, patients younger than ten years of age, and in those individuals who had bilateral dislocation

One-third of the patients who had been treated by the bifurcation operation, and a large percentage of those individuals who had bilateral dislocation and had been treated by means of the shelf operation required subsequent surgery. Pain and fatigue were present in two-thirds of the cases in which the bifurcation operation had been performed, while in the cases in which the shelving operation had been done, only one-third of the patients complained of either pain or fatigue

RICHARD J. BENNETT, JR., M.D.

Blumensaat, C. : Secondary Necroses of the Head of the Femur Following Traumatic Dislocation of the Hip Joint. (Ueber sekundäre Schenkelkopfnecrosen nach traumatischer Hüftgelenksverrenkung.) *Arch f klin Chir*, 1936, 185 720

The author adds 4 of his own cases to the few reported observations on necroses of the hip joint following traumatic dislocation. They were those of a six-year-old girl, a thirty-three-year-old miner, a fifty-five-year-old farmer, and a sixty-year-old traveling man. Inasmuch as a bacterial origin for the secondary necroses can be eliminated, the following 4 possibilities come up for consideration: (a) disturbances of the blood supply, (b) primary traumatic injury of the head of the femur during the luxation or secondary mechanical injury, (c) a combination of the causes mentioned under (a) and (b), and (d) other endogenous conditions

It is known that disturbances in the vascular supply of the head of the femur may produce necrosis. Inasmuch as the necrosis following the different forms of dislocation of the hip always appears at the same site, namely, in the upper lateral to the middle third of the head, and therefore independently of the site of the capsular rupture, a partial loss of the blood supply (a) produced thereby cannot produce such a necrosis. It is compensated by collateral circulation. Similarly, the duration of the dislocation has no influence. One fact is striking: persons from six to twenty-three years of age, without exception, present Perthes' disease, that is, a total aseptic necrosis. Following that, after the growth of bone has been concluded, the circumscribed focal necrosis develops. According to Nussbaum, anastomoses between the blood vessels of the head and neck of the femur do not exist in the incompletely developed bone, but appear later. The vascular supply, therefore, plays a considerable but not an exclusive part, as otherwise the appearance of necrosis following dislocation of the hip would be more frequent. In addition to the vascular disturbance a primary injury of the head of the femur, in the sense of a fracture of the cap of the head, difficult of recognition (b), or a severe contusion with a subfractural injury of the head, is assumed by some authors. In the author's cases a fracture of the cap

of the head must be denied. Furthermore it must be said that the head of the femur is not or is only rarely immediately affected by the trauma leading to the dislocation. Injury from the reduction maneuver is also unlikely. On the other hand the assumption of a later injury of the head of the femur with the return of weight bearing is justified. In this way either a subfracturally injured head may become necrotic and break down or partial breaking down may occur in a head which as a result of more or less extensive vascular disturbance already was completely or partially necrotic.

As histological evidence of a subfractural injury of a dislocated head of the femur is not available we must subscribe to the authors' assumption of necrosis from mechanical injury of necrotic bone tissue following a vascular disturbance. The nutritional disturbance produced by the luxation results in a complete or partial necrosis of the head which cannot cope with the demands made upon it by functional use. If no mechanical demand is made upon it recovery follows. Therefore two stages are to be differentiated: the true necrosis of the head resulting from vascular disturbance and the secondary breaking down as the result of the necrosis. The first stage is usually not recognizable roentgenologically. The assumption of a combined injury explains also the seat of the necrosis at the site of the greatest weight bearing pressure on the head from which necrosis in young persons under twenty five years of age must be excepted.

As compared with osteochondritis dissecans there are certain differences. A necrotic wedge with symptoms of the dissection is not to be expected. Although a demarcation occurred in 2 cases, it was not present in the other 2 cases or it appeared very late. Complete separation into a free body or healing in of the necrotic wedge has not been described heretofore in luxation necrosis in contrast to osteochondritis dissecans. The necrotic wedge is apparently always absorbed. The absence of healing in may be due to deficient reaction of the femoral head or to the broader wedge and flatter form of the necrotic focus. Even before the healing in occurs there appear slighter traumatic injuries of the vicinity with perforation of the edges and more extensive necrosis and resorption.

To what extent endogenous factors such as constitutional inferiority, rickets, endocrine disturbances and deficiency diseases are of importance remains undetermined.

The time at which the first subjective symptoms become manifest varies with the severity of the nutritional disturbances: duration of the immobilization and the time of weight bearing. In the majority of the cases the secondary necrosis is determined only after several months up to one or two years after the luxation, or it is discovered after years in connection with a follow up examination in a more or less stiffened hip joint. The beginning of the secondary necrosis was determined on an average after six to twelve months at the earliest after three

months and at the latest after four years. The first symptoms consist of pains and as no objective changes are visible roentgenologically energetic physical after treatment is often given to injured individuals which treatment gives rise to the secondary necrosis. There are then limitations of motion, pains on weight bearing and pains in the hip joint, the loin, knee or in the entire affected leg. Emaciation of muscle and shortening of the leg are important signs. With treatment for relieving weight bearing the symptoms seem to abate somewhat after one or two years and a moderate objective improvement seems to set in. The true necrotic process usually seems to be ended after from two to four years. Complete freedom from pain and mobility seems to occur only in young persons.

The treatment corresponds with that of osteochondritis dissecans and of Perthes disease.

In the diagnosis of the primary necrosis of the head of the femur the roentgenologically demonstrable normal or increased calcium density of the head of the femur in contrast with the atrophy of the diaphysis is of the greatest importance. This evidence is obtainable after from two to three months. The treatment for relief from weight bearing must be carried out for that length of time if a shading of the femoral head appears; this treatment must be continued further. Before weight bearing is again allowed a careful roentgen examination is necessary so as to avoid the secondary mechanical necrosis. This lesion has no considerable importance in traumatic medicine because of the long continued inability to work from two to four years and the subsequent great permanent injury which is found in from 40 to 50 per cent of the cases.

(W. GROSS) Loma Linda, N. D.

Johansson S. Operative Treatment and Results in Fracture of the Neck of the Femur. *Brit. M. J.* 1937 2: 361.

The writer states that with proper technique including exact reposition and good fixation and not too quick removal of the nail fractures of the femoral neck can be healed as easily as others.

Johansson has used his method of extra-articular osteosynthesis since 1932. It consists of reduction, fixation without exposure of the fracture site with the use of the Smith-Petersen nail and artificial impaction (Cotton).

The reduction by wire traction through the tibial tuberosity is accomplished in bed and requires about one week of traction. Then the patient is transferred to the extension table and under local and ether anesthesia the internal rotation of about 25 degrees is done with maintenance of the extension and about 45 degrees of abduction.

The localization technique for the insertion of the guide wire is described. Roentgen ray films taken in two planes check the proper reduction and insertion of the wire guide. The nail which is bored through is threaded over the wire and inserted across the fracture line. The wire is withdrawn. Several blows on

the shaft just below the trochanter produce the desired artificial impaction.

After the operation the patient is placed in bed with the knees and hips slightly flexed. During the month spent in bed, the limbs are mobilized, and the muscles are massaged and stimulated with the faradic current. Very old patients are allowed to sit out of bed earlier.

A walker is used for early weight bearing, followed by crutches. Roentgenograms are made at intervals. The author had to reoperate in about 10 per cent of his cases.

DANIEL H. LEVINTHAL, M.D.

Meekison, D. M.: A Hitherto Undescribed Fracture of the Patella. *Brit J Surg*, 1937, 25 64.

The author describes three cases of fracture of the patella and summarizes the descriptions with the following statements:

The mechanism seems to be a rather severe injury, in the main consisting of a glancing blow on the patella from the inner side directed obliquely posteriorly, whereby the inferior and medial corner of the articular surface is knocked out, presumably by the lateral condyle of the femur.

The loose fragment is always found in the lateral pouch, can be palpated, and is tender. Roentgen-ray examination with present-day technique does not reveal this fracture.

Convalescence is always prolonged with the prospect of some slight permanent disability. The only treatment so far seems to be arthrotomy, repair of the quadriceps, inspection of the fibro-cartilages, and removal of the fragments. E. C. ROBITSHLEK, M.D.

Caldwell, E. H.: Treatment of Compound Fractures: Results in 100 Cases of Compound Fractures of the Tibia. *Arch Surg*, 1937, 35 368

This review is limited to 100 compound fractures of the tibia seen over a ten-year period at the Bellevue Hospital, New York City. The chief problem was prevention of serious infection. Half of the cases treated more than two hours after the accident developed infection, while only 20 per cent of those seen within two hours became infected. Ideally, the patient should be on the table within an hour after the accident. Débridement, reduction, and immobilization of a fracture need not be shocking procedures, the author believes they should be carried out coincidentally with, and as a part of, shock treatment. Emphasis is placed on débridement and the mechanical cleansing of wounds, no matter how small. Débridement was done in 7 of 27 cases in which the wound was less than $\frac{1}{2}$ in. in length, only

1 infection developed. Débridement was not done in 20 cases, and infection ensued in 5 of these. The ratio of infections was evenly distributed, from 17 to 21 per cent, in cases in which the wound was sutured without drainage, left wide open, or kept open by packs. The combined suture and rubber drain method was condemned, the incidence of infection (43 per cent) was twice as great as when the other methods described were used. Internal fixation of these potentially infected wounds should be reserved for the exceptional fracture in which mechanical cleansing is satisfactory and in which reduction cannot be retained by other methods. The incidence of infection in those immobilized by traction was 30 per cent, and by plaster cast, 24 per cent. Three of 21 patients treated by traction had delayed union; only 1 of 63 treated with plaster failed to present bony union within six months.

JEROME G. FINDER, M.D.

Couvelaire, R., and Rodier, P.: A Type of Fracture of the Tibia Characterized by the Splitting of the Lower End into 3 Fragments (Sur une variété de fracture par éclatement du pilon tibial, fracture isolée à 3 fragments) *Rev d'orthop*, 1937, 24 329

The authors believe that this fracture merits special consideration because of the method of its production and the characteristic lesion produced. Three examples are cited, all of which occurred in men who had jumped or fallen when the foot was in the position of extreme flexion. The force was exerted without any torsion, which explains the integrity of the malleoli. Splitting of the lower end of the tibia is produced by the impact of the astragalus. A Y-shaped fracture usually results, the stem of the Y being about midway between the malleoli. This forms a medial and lateral fragment, both roughly triangular in shape, with the shaft of the bone forming the third and upper portion, the diaphyseal fragment.

Clinically there is immediate loss of function, rapid swelling, lateral and dorsal ecchymosis, pain on pressure over the lower tibia, and increase in width between the malleoli.

Reduction must be perfect to give satisfactory results. It should be performed under general or spinal anesthesia so that the fragments may be freed and remolded into their original form. If this cannot be accomplished satisfactorily with the aid of the fluoroscope, surgical treatment should be undertaken so that the fragments may be held in position by bone screws.

MARSH W. POOLE, M.D.



SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Johnston C H Combined Ligation and Injection Treatment of the Varicose Great Saphenous Vein *J Am U Ass* 1937 109 1359

Recurrence in cases presenting incompetent saphenofemoral valve when treated by injection alone or by ligation and injection alone is far too common

Ligation at the saphenofemoral junction dissecting out and section of all five branches at that level and injection of the distal end of the saphenous vein is the treatment of choice

All cases in which the saphenofemoral valves are incompetent are indicated for the ligation injection treatment

Until some newer idea or operation supplants the ligation injection form of treatment, it must be admitted that it gives the greatest promise of permanent success with the least amount of danger pain or mutilation in the more extensive varicose veins

Murray D W G Jaques L B Perrett T S and Best C H Heparin and the Thrombosis of Veins Following Injury *Surgery* 1937 3 163

While it is a well established fact that heparin increases the coagulation time of the blood little or no experimental work has been carried out on the effect of this anti-coagulant on thrombosis of blood vessels resulting from injury to the intima The authors report the results of an experimental study on laboratory animals as well as clinical observations on the use of heparin as an anti coagulant Injury to the lining of the veins was produced by two procedures the first mechanical and the second chemical A description is given of the methods used to produce injury to the veins and to administer the heparin solution The experimental results are shown in detail

The objectives in these clinical investigations were to determine the toxicity of the heparin preparations on human subjects and to study its effect on the clotting time of the blood The Houch unit of heparin is the amount which will prevent the clotting of 1 c cm of cat's blood for twenty four hours The heparin available for earlier studies had a potency of approximately 5 units per milligram Illustrative of the high degree of purification some of the heparin used by the authors was of the order of 500 units per milligram This high degree of purification eliminates toxic products In these studies it has been shown (1) that no deleterious effects were produced in several cases in which regional heparinization was carried out with moderately pure heparin and (2) that with the use of highly purified material prolonged general heparinization appears feasible

The results of these experiments from observations on some 300 veins indicate that the incidence of obstruction of peripheral veins in dogs by thrombi

formed as a result of certain mechanical or chemical injuries to the intimal surfaces of the blood vessels is definitely decreased when solutions of purified heparin are administered before and for prolonged periods following the injury The findings in the experiments in which injury was produced by chemical means suggest that the effect of heparin is clearly seen only under conditions in which the extent of the injury is just sufficient to produce thrombosis in most of the veins of an animal which do not receive the anti coagulant Thrombi have not been observed even after very severe chemical injury while the animal was well heparinized

The clotting time of the blood of the human subject may be increased by the intravenous administration of solutions of highly purified heparin This procedure produces no deleterious effects even when the heparinization is maintained for as long as five days General heparinization was carried out postoperatively in 76 patients The clotting time of the blood in one limb of the experimental animal or human subject may be increased by the intra arterial administration of heparin without affecting to more than a slight degree the clotting time of the blood in other parts of the body This is true only when the rate of injection of heparin is relatively slow

Some of the directions along which further investigations may proceed are discussed by the writers

HENRIET F THURGOOD MD

Akesson N A Contribution to the Treatment of Arterial Embolism (zur Beitrage zur Behandlung der Arterienembolien) *Acta chirurg Scand* 1937 79 575

In the author's opinion the circulatory disturbances in cases of arterial embolus are due partly to vascular spasms which favor the occurrence of secondary thrombosis Under reference to Denk's statistics he recommends eupaverin as a means of reducing the spasms As it is impossible however to decide with certainty whether the occurrence of the secondary thrombosis is prevented he believes that in case of embolus of the extremities the treatment with eupaverin should as a rule be combined with surgical intervention and he describes a case which confirms this view

Carcassonne F and Haimovici H The Treatment of Arterial Embolism of the Extremities (Le traitement des embolies arterielles des membres) *Lyon chir* 1937 34 553

Up to the last few years arterial emboli of the extremities were treated by embolectomy i e, an attempt was made to remove the intravascular obstruction surgically However the operation was never successful because of its extremely delicate technique and because of its disregard of certain

physiopathological phenomena arising in relation to the location of the embolus and its intravascular reactions.

Carcassonne and Haimovici have conducted a series of interesting experiments in their surgical clinic, the results of which will be published later and may perhaps be of considerable value in the future treatment of arterial embolism of the extremities.

The authors have observed that soon after the formation of an arterial embolus intravascular lesions of an "embolic arteritis" appear. This is considered to be an adventitial reaction which occurs even in the presence of aseptic emboli. Therefore, in order to be successful, embolectomy should be performed very early and under conditions which are often difficult to improvise. The results obtained depend primarily upon the degree of intensity of the embolic arteritis. Secondary thrombosis, which is commonly believed to be due to the surgical intervention itself, is usually the result of an inflammatory periarterial and endoarterial process.

The authors state that up to the present time there has been a tendency to consider arterial embolism as a purely mechanical accident which produces primarily an arrest of the circulation. Its secondarily produced vasomotor effect resulting in an angiospasm has been entirely overlooked.

In regard to treatment, therefore, the authors suggest that in cases of arterial embolism of the extremities an embolectomy may be successful if performed within twelve hours following the accident. If the accident is older than twelve hours, an arterial resection or a thrombo-arteriectomy, possibly complemented with a gangliectomy or with the anesthetic infiltration of the sympathetic chain, should be performed.

Arterial resections should be made in segments with particular care to save the collateral circulation as much as possible. Fiolle has modified the technique of arteriectomy by a method which he called "economical thrombo-arteriectomy." This technique consists in resecting the arterial segment where the embolus has lodged and in complementing this procedure by removal of the thrombus, which has formed in both directions, as completely as possible without injuring too severely the vascularity of the area by unnecessary traumatism. In this fashion the surgeon will be able to save certain collaterals which are essential to the restoration of the circulation.

The authors report the case of a man in whom they resected the popliteal artery in its so-called "dangerous portion." Eighteen months later by means of arteriography they observed a complete restoration of the circulation of the affected lower extremity.

In discussing further the value of sympathectomy, the authors do not believe that this operation produces serious cardiac complications as the result of the vasodilatation, as some authors have pointed out.

Concerning the value of medical treatment such as the anesthetic infiltration of the sympathetic chain and the administration of eupaverine, the authors suggest that these therapeutic measures may always be tried out pre-operatively, but if within one hour no results are obtained, surgical intervention becomes imperative.

In cases of embolism associated with myocardial decompensation watchful expectancy is recommended. Medical treatment should be instituted at once, whereas surgery should be deferred.

RICHARD E. SOMMA, M.D.

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The clotting time of the blood of the human subject may be increased by the intravenous administration of solutions of highly purified heparin. This procedure produces no deleterious effects even when the heparinization is maintained for as long as five days. General heparinization was carried out postoperatively in 76 patients. The clotting time of the blood in one limb of the experimental animal or human subject may be increased by the intra arterial administration of heparin without affecting to more than a slight degree the clotting time of the blood in other parts of the body. This is true only when the rate of injection of heparin is relatively slow.

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Up to the last few years arterial emboli of the extremities were treated by embolectomy. The attempt was made to remove the intravascular obstruction surgically. However the operation was never successful because of its extremely delicate technique and because of its disregard of certain

structures, and minimal stress and strain on the wound during the repair process. The author believes that the paramedian incision does not observe these prerequisites because the aponeurosis of the abdominal muscles is cut transversely to the direction of its fibers. The fact that the incidence of ventral hernia with longitudinal incisions is small is rather a tribute to the ability of the anesthetist and the quality of the suture material.

The author answers the objections of those who are opposed to the upper transverse incision on the basis that the rectus abdominis is divided transversely. He finds that the rectus abdominis, from the lowest rib to the xiphoid, the interchondral length, has little contraction compared to its lower portion or subcostal length. The following is a table of measurements taken on 12 male adults.

COMPARISON OF THE CONTRACTION OF THE RECTUS ABDOMINIS MUSCLE ABOVE THE LEVEL OF THE LOWER RIBS WITH THE PART BELOW THIS LEVEL.

	Average Length of Rectus from Symphysis to Xiphoid	Average Interchondral Length	Subcostal Length
Relaxed	14 2"	7 15"	7 05"
Contracted	7 4"	5 10"	2 30"
Shortening	48 per cent	29 per cent	67 per cent

The author claims that the paramedian incision with retraction of the rectus makes deep structures more inaccessible. The herniation of gut through a longitudinal incision indicates that the mechanics of the abdomen have been altered. Emphasis is placed on the ease with which transverse incisions are repaired, especially the ease with which the peritoneum is efficiently closed, thus precluding the possibility of hernia.

In the approximation of a wound, the suture material should simply draw the two edges together without tension. Venous constriction is recognized by the blueness of the wound edge. Lymphatic constriction in a skin wound appears as a hard pink or white edge. The author believes that the mucosa of an organ cannot be sutured without the occurrence of lymphatic obstruction.

The behavior of tissue in the process of healing is actually the behavior of granulation tissue, or fibrovascular tissue, and that of the epithelial component. Granulation tissue is a prerequisite of wound healing. Chemical substances have a formative action and aid in the appearance of granulations. If, however, such substances are used for a prolonged time they cause the formation of proud flesh by reason of excessive stimulation. The lack of Vitamin C content in tissue will limit or prevent the appearance of granulation tissue. Therefore the surgeon must guard against a subcorbutic state.

The hemoglobin content of the blood should be maintained at a normal level. A low hemoglobin is an indication of a lack of accessory food factors. It takes six days for the metaplasia of the fibroblasts of the granulation tissue to collagen and until this is established there is actually no union of the wound edges.

Epithelialization does not occur, as is taught in text books, by the mitosis of the epithelial cells at the wound edge. Loeb has shown that a jelly-like coagulum forms under the scab of a wound and this coagulum is more adherent to the overlying scab than to the underlying granulation tissue. The adult epithelial cells migrate by aid of this coagulum and form a thin epithelial surface. After migration is completed the epithelial cells then may stratify by mitosis and grow downward. It is to be noted that in the removal of the scab or gauze dressings, these epithelial cells are also removed, since they are more adherent to the latter than to the subjacent granulation tissue. A small pinch graft or local Vitamin A dressing stimulates epithelial migration from the wound edge.

BENJAMIN G P SHAFIROFF, M D

Rosenthal, S R : Neutralization of Histamine and Burn Toxin. *Ann Surg*, 1937, 106 257

On the basis of reported experimental work, the author concludes that:

1 There are indications that the serum of healed shoats, pigs, and human beings contain substances which will neutralize histamine and burn toxin, as determined by the action of the mixture on the virgin guinea-pig uterus. This reaction takes place at room temperature, from 30° to 24° C., ice-box temperature, from 2° to 4° C., and incubator temperature, 37° C. Heating to 60° C for half an hour does not destroy this action.

2 Normal serum also neutralizes histamine and burns toxin to a limited extent, and then only at incubator temperature, 37° C, for a period of time.

STANLEY J SEEGER, M D

Tangari, C : A Clinical and Statistical Study of 176 Cases of Tetanus (Studio clinico-statistico su 176 casi di tetano). *Riv di chir*, 1937, 3 389

Tangari reports on 176 cases of tetanus, including those admitted *in extremis*, received at the Union Hospitals of Naples during the past decade. The mortality in the first five years averaged 64 per cent; in the last five, during which intravenous, intramuscular, and intraspinal administration of antitoxin was pushed systematically, 37.68 per cent. The 9 cases of cephalic tetanus had a mortality of 77.7 per cent. When antitoxin was given within twelve hours after the first appearance of the symptoms, 98 per cent of the patients recovered, within eighteen hours, 94.75 per cent, within thirty-six hours, 86 per cent.

Several interesting aspects are brought out. The most important factor in prognosis was the length of time elapsing between the first symptoms and the generalized spasms. No marked anaphylactic reac-

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Fieschi D. Rubber Plastics—New Tissue—Observed after Twenty Five Years (Gummiplastische—nuova carne—osservate dopo 25 anni) *Arch Ital di chir* 1937, 46 221

During the author's early work with resection of tuberculous joints and the use of rubber drain tubes and irrigation he noted that human tissues tolerated the presence of rubber unusually well. In 1906 he examined a woman with a recurrent strangulated hernia. The large hernia was covered with skin alone. The two previous operations were performed by good surgeons, but the hernia recurred nevertheless. At the operation in 1906 it was obvious that the usual fascial structures were not sufficient for the repair of the defect. The surgeon chose to use a piece of sponge rubber as a plug over the large defect and covered the sponge with a portion of the sartorius muscle. Seven years later there was no recurrence. This success stimulated the author to apply this method both experimentally and clinically.

The use of sponge rubber in large direct inguinal hernias with large openings is attended by fair success. In these patients the rubber sponge is placed between the intact peritoneum and the muscle wall and extending about a cm under the muscle in the entire periphery. The sponge is then covered by the external oblique or other muscle or fascia. The same method has been applied to other large hernias.

The author has successfully employed a rubber sling to suspend a badly ectopic kidney to the ribs.

In cosmetic or plastic surgery the author has used sponge rubber to form a breast in the absence of a mammary gland. Rubber has been used to give shape to the external ear in lieu of cartilage. It has been used to hold fragments of fractured bone together.

The sponge rubber thus placed within the body has its interstices filled by growing connective tissue which gives the real support to the structure. The sponge behaves as a bridge for the growth of new tissue.

A. LOUIS ROSE M.D.

Pflicher R. Pulmonary Embolism. A Statistical Investigation of Its Incidence in Twelve London Hospitals in the Decade from 1925 to 1934. *Brit J Surg* 1937 25 42

This investigation was undertaken primarily to determine whether pulmonary embolism has a seasonal or epidemic incidence. An impression that it had both was apparently, widely accepted. The first source of information was useless in that the office of the Registrar General was able to supply details of only 35 cases of fatal pulmonary embolism verified by postmortem examination in London from 1929 to 1934. The source of material for

analysis comprised 731 cases of fatal pulmonary embolism occurring from 1925 to 1934 at twelve London hospitals. The diagnosis was proved in every case by post mortem examination.

It is suggested that during this decade a considerable number of cases have escaped diagnosis and that the incidence of pulmonary embolism is higher than is generally recognized. The incidence of pulmonary embolism in hospitals varied from 0.050 to 0.142 per cent, and it was not confined to the obviously sick as shown by the patients brought in dead who figure in the hospital records.

No evidence has been found to support the impression that pulmonary embolism has any seasonal or epidemic incidence.

In 573 patients there was a history of trauma in 158 patients there was none. The predominance of traumatic cases is partly due to the high proportion of surgical patients admitted to the hospitals. A rough approximation shows an incidence of 0.105 per cent in surgical cases and 0.064 per cent in medical cases.

It is suggested that a more important factor in the cause than the nature of the illness or trauma is immobilization of the patient. In traumatic cases the interval between trauma and death varies from one day to many weeks and the supposed primary thrombosis was found in the veins of the right leg more commonly than in those of the left. There appears to be an association between injuries or operations on the right side and thrombosis in the veins of the right leg. This has not been observed however in cases of postoperative thrombosis not followed by fatal embolism.

The age incidence reaches a maximum in the five years from fifty five to sixty both for traumatic and non traumatic cases.

In the non traumatic cases there are equal numbers of males and females. In the traumatic cases females are in the majority. It has not been possible to estimate the true sex or age incidence because of lack of information about the sex and age of the hospital population.

The author used Fisher's Statistical Methods for Research Workers to test his conclusions.

JOHN E. KIRKPATRICK M.D.

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Wright R. D. Wounds and Incisions. *Med J Australia* 1937 1 859

The author describes two types of wound, the deliberate or purposive wound and the accidental wound. In both cases the clinical aim is to aid the repair process. The requisites of a well planned or surgical wound are adequate access to the part treated a minimum of damage to anatomical

A detailed study of 900 selected cases demonstrates that the postoperative course following spinal anesthesia was less disturbed than that following general anesthesia.

There was no significant difference in the incidence of postoperative complications in 450 cases following spinal anesthesia as compared to 450 similar cases following general anesthesia. No serious disadvantages of spinal anesthesia have been demonstrated to outweigh its obvious and great advantages. Spinal anesthesia is a safe and satisfactory anesthetic under the conditions outlined, which include a proper selection of cases and a carefully controlled technique.

In the discussion Jackson stated that he believed the sheet anchor in the use of spinal anesthesia was the administration of ephedrine in the proper amount, in the proper place and at the proper time. This time is five minutes before the spinal tap with not an ordinary hypodermic needle, but a needle long enough to deposit it in the paraspinal muscle group, which would insure its immediate absorption and protective action.

The recommendations which Jackson made were as follows:

1. One should use only small spinal puncture needles of No. 22 gauge. With these postspinal tap leakage of fluid is less likely and possible trauma lessened.
2. Care should be taken to avoid loss of spinal fluid during the procedure.
3. The patient should be kept in bed without a pillow for twenty-four hours. This is most important and this rule should be followed explicitly without any exception in order to prevent headache.
4. If, however, headache should develop, 4 minim doses of ephedrine, given intramuscularly and repeated two to four times at hourly intervals, generally give relief. If not, 1,000 c cm. of 5 per cent normal saline solution, administered intravenously, almost always gives relief.

At the Jackson clinic 2 c cm. of a 1 per cent solution, that is, 20 mgm. of pontocaine solution are mixed with an equal amount of spinal fluid. For upper abdominal surgery 4 c cm. are given. For lower abdominal work 2 or 3 c cm. were sufficient. Injection for upper surgery should be given between the first and second lumbar vertebrae and decidedly slower than injections of novocain, at a rate of 4 c cm. in one and one half minutes.

Lahey stated that three solutions are now used in the Lahey clinic for spinal anesthesia. Novocain is used very little, procaine is used for anesthesia up to two hours, and nupercaine for a period up to five hours. A dilute solution, 20 c cm. of a 1:500 solution, according to Howard Jones of London, is employed, and this produces an anesthesia lasting up to five hours.

Matas, while admitting that he was responsible for the use of the first spinal anesthesia in this country, now believes that general anesthesia is better.

JOHN J. MALONEY, M.D.

Kirschner, M.: Spinal Anesthesia (Die einstellbare guertelfoermige und individuell dosierbare Spinalanästhesie) *Norsk Mag f Lægevidensk*, 1937, 98: 225.

With the choice of the anesthetic the operator assumes a great responsibility, often a greater one than in deciding to operate and choosing the method of operation. In many cases the life or death of the patient depends upon the choice of anesthetic. The advantages of local anesthesia over a general anesthetic are self evident. Under local anesthesia, spinal anesthesia is a very important procedure. The anatomical, physiological, and experimental bases for spinal anesthesia are reviewed and the different procedures are discussed critically. The disadvantages of spinal anesthesia, especially of high spinal anesthesia in its present technique are: uncontrollability of its extension upward, unnecessarily wide extension caudally, a relatively high percentage of complications, and frequent unpleasant after-effects. Kirschner avoids these disadvantages by his technique.

The method consists of the introduction of a little air into the caudal portion of the dural sac after evacuation of some of the liquor, followed by the cranialward injection of the anesthetic solution (a $\frac{1}{4}$ per cent procaine solution with the addition of glucose by which the solution obtains a viscosity which will not mix readily with the liquor and with a specific gravity of 987) by means of a needle having a lateral opening. The patient is in an elevated pelvis position. By this method the fluid, which has a lighter specific gravity than the liquor, floats upon it like a film of oil and is limited caudally by the bleb of air. The nerve roots in the realm of the dural sac are protected from the anesthetic solution by the air, and the upper nerve roots above the film, by the unchanged liquor. Only a small cylindrical portion, or girdle, of the spinal nerves is anesthetized. After observation of the effect upon the skin, exact elevation is controlled by addition or withdrawal of air, the limitation of the width of the anesthetic zone, by the addition of more solution. Contrary to the former technique, it has been shown that to limit the anesthesia caudally below the anesthetic zone, it is sufficient to produce only a liquor-free, air-free space, or vacuum, that is, to leave the dural sac empty and dry, which can be accomplished by the withdrawal of from 20 to 30 c cm. of liquor, until the pressure in the sac is zero. By this method the dura becomes folded and places itself tightly around the cord and spinal roots. It has been shown that for a definite level film upon the liquor a few cubic centimeters of air, from 2 to 3, are sufficient. Although one can primarily influence the site of the injected fluid by the amount of liquor withdrawn, one can secondarily elevate the site cranially by increasing the amount of air introduced in the dural sac. The instrumentarium consists of air tight syringes of 5 and 10 c cm. content, rubber tubing with a small glass tube in the center, and a spinal needle with a lateral opening.

tions occurred. The most probable hypothesis as to postoperative tetanus is that the patients are intestinal or skin carriers. Tangari discusses post war tetanus following operations on old traumatic foci as a variety of autogenous tetanus. He also reviews the relationship of geological formations to the incidence of the disease as demonstrated in the World War. Clay soils are particularly favorable to longevity of the spores. Although no actual tetragenous areas have been found in Italy, Naples appears to have a noteworthy prevalence of the disease, which is not decreasing. The author suggests a relationship with the tufa formations, or calcium carbonate and abundant silicates. In general, the supplanting of horses with machinery in agriculture and mining should greatly diminish the occurrence of tetanus.

M E Morse MD

Miller H. The Staphylococci Antitoxin Titer in Chronic Osteomyelitis and Its Differential Diagnostic Evaluation. (Staphylokokkenantikörpergehalt bei chronischer Knochenmarkentzündung und seine differentialdiagnostische Verwertbarkeit). *Beitr z klin Chir* 1937 165 464

The following trend of thought forms the basis for the understanding of the staphylolytic reaction. Staphylococci yield a toxin which dissolves the red blood cells of the rabbit. The infected organism builds an antitoxin against the staphylococci which is to be found in the serum. The toxin can be recovered from staphylococcal cultures. If the patient's serum is mixed with definite dilutions of the toxin and the red blood cells of the rabbit are added thereto as an indicator, hemolysis will make its appearance and signifies that the serum does not contain any antitoxin and therefore comes from a healthy person. If on the other hand hemolysis is hindered it shows that the serum contains antitoxins which arrest the action of the toxin and the patient therefore is suffering from a staphylococcal infection.

The author examined the sera of 105 patients. Particulars concerning the method of examination and a criticism of the various procedures and view points may be found in the original. In 17 of 18 cases of osteomyelitis the sera showed an increase of the anti-staphylolytic titer which was marked in some instances. As to whether the one negative result was to be attributed to the fact that the examination was perhaps made during a quiescent phase or whether it was due to the fact that the organism still needed a longer period for increasing the antibodies was difficult to decide. Of 25 cases of staphylococcal infection of the soft tissues only 3 yielded an increased titer. Of 14 normal sera 1 showed an inappreciable increased titer. Of 48 patients with different diseases 2 with sarcoma yielded a positive reaction, all the others did not. In the 2 patients the sarcoma had not been positively proved histologically and there was small cell infiltration around the blood vessels which perhaps indicated that the condition was of an infectious

nature possibly due to staphylococci. Since the anti-staphylolysin represents the react or against the existing toxin, demonstration of its presence was not possible immediately at the beginning of the infection but rather later, and in suppurations involving the soft parts not before fourteen days had passed (Rosenburg). In suppurations involving the bone it was demonstrable only after from the eighth to the eleventh day (Rosenburg). In 1 of the author's cases it was demonstrable after the fourth day. The reaction still remained positive for two or three months after the inflammation had subsided.

With respect to the differential diagnosis especially from tumors syphilitic neoplasms and tuberculous foci it is important that the existence of another disease coincidental with staphylococcal infection cannot be excluded. The prognostic value of the anti-staphylolysin reaction is denied by most of the authorities, but the author nevertheless bases his opinion on the experience of Gross at firms its value. (Block) HARRY J. BULLARD, MD

ANESTHESIA

Dworkin S, Bourne W and Raginsky B B. The Action of Anesthetics, Sedatives and Hypnotics on the Higher Nerve Centers. (*Acti on des anesthésiques sédatifs, hypnotiques sur les centres nerveux supérieurs*). *Anes et anal*, 1937 3 335

This is the report of a study of the effect of various anesthetic drugs, sedatives and hypnotics on conditioned reflexes in animals. The authors state that up to the present time the effect of alcohol on the cerebral centers has been practically the sole interest in this general problem.

Two cats and two dogs were trained to respond to electrically produced notes and their alimentary reactions were studied after they were treated with various agents such as avertin, sodium amylalcohol, paraldehyde, nembutal, morphine, hyoscine, carbon dioxide, nitrous oxide, and ethylene. It was found that hyoscine and morphine, by producing a nausea, suppressed all desire for food in the animals and abolished all motor attempts to obtain food. Carbon dioxide, nitrous oxide and ethylene used only on cats always produced a simple weakening of the positive reflexes and at times an increase in the negative reflexes. Cerebral excitation as some times occurs in man was not noted. Modifications in the reflexes brought about by alcohol, sodium amylalcohol, nembutal, avertin and paraldehyde occurred in four stages: ataxia, loss of intercalary inhibition, loss of differentiation and loss of positive response.

From their own results and established facts the authors conclude that these results are due to progressive cortical depression. JOHN MARTIN MD

Lehman E P, Risher J C and Bippus W E. Spinal Anesthesia. *Ann Surg* 1937 106 118

The anesthetic mortality rate under spinal anesthesia in 539 cases was 0.028 per cent.

A detailed study of 900 selected cases demonstrates that the postoperative course following spinal anesthesia was less disturbed than that following general anesthesia.

There was no significant difference in the incidence of postoperative complications in 450 cases following spinal anesthesia as compared to 450 similar cases following general anesthesia. No serious disadvantages of spinal anesthesia have been demonstrated to outweigh its obvious and great advantages. Spinal anesthesia is a safe and satisfactory anesthetic under the conditions outlined, which include a proper selection of cases and a carefully controlled technique.

In the discussion Jackson stated that he believed the sheet anchor in the use of spinal anesthesia was the administration of ephedrine in the proper amount, in the proper place and at the proper time. This time is five minutes before the spinal tap with not an ordinary hypodermic needle, but a needle long enough to deposit it in the paraspinal muscle group, which would insure its immediate absorption and protective action.

The recommendations which Jackson made were as follows:

- 1 One should use only small spinal puncture needles of No. 22 gauge. With these postspinal tap leakage of fluid is less likely and possible trauma lessened.

- 2 Care should be taken to avoid loss of spinal fluid during the procedure.

- 3 The patient should be kept in bed without a pillow for twenty-four hours. This is most important and this rule should be followed explicitly without any exception in order to prevent headache.

- 4 If, however, headache should develop, 4 minim doses of ephedrine, given intramuscularly and repeated two to four times at hourly intervals, generally give relief. If not, 1,000 c cm of 5 per cent normal saline solution, administered intravenously, almost always gives relief.

At the Jackson clinic 2 c cm of a 1 per cent solution, that is, 20 mgm, of pontocaine solution are mixed with an equal amount of spinal fluid. For upper abdominal surgery 4 c cm are given. For lower abdominal work 2 or 3 c cm were sufficient. Injection for upper surgery should be given between the first and second lumbar vertebrae and decidedly slower than injections of novocain, at a rate of 4 c cm in one and one half minutes.

Lahey stated that three solutions are now used in the Lahey clinic for spinal anesthesia. Novocain is used very little, procaine is used for anesthesia up to two hours, and nupercaine for a period up to five hours. A dilute solution, 20 c cm of a 1:1500 solution, according to Howard Jones of London, is employed, and this produces an anesthesia lasting up to five hours.

Matas, while admitting that he was responsible for the use of the first spinal anesthesia in this country, now believes that general anesthesia is better.

JOHN J. MALONEY, M.D.

Kirschner, M.: Spinal Anesthesia (Die einstellbare guertelfoermige und individuell dosierbare Spinalanesthesia) *Norsk Mag. f. Laegevidensk.*, 1937, 98:225.

With the choice of the anesthetic the operator assumes a great responsibility, often a greater one than in deciding to operate and choosing the method of operation. In many cases the life or death of the patient depends upon the choice of anesthetic. The advantages of local anesthesia over a general anesthetic are self evident. Under local anesthesia, spinal anesthesia is a very important procedure. The anatomical, physiological, and experimental bases for spinal anesthesia are reviewed and the different procedures are discussed critically. The disadvantages of spinal anesthesia, especially of high spinal anesthesia in its present technique are: uncontrollability of its extension upward, unnecessarily wide extension caudally, a relatively high percentage of complications, and frequent unpleasant after-effects. Kirschner avoids these disadvantages by his technique.

The method consists of the introduction of a little air into the caudal portion of the dural sac after evacuation of some of the liquor, followed by the cranialward injection of the anesthetic solution (a $\frac{1}{4}$ per cent procaine solution with the addition of glucose by which the solution obtains a viscosity which will not mix readily with the liquor and with a specific gravity of 0.87) by means of a needle having a lateral opening. The patient is in an elevated pelvis position. By this method the fluid, which has a lighter specific gravity than the liquor, floats upon it like a film of oil and is limited caudally by the bleb of air. The nerve roots in the realm of the dural sac are protected from the anesthetic solution by the air, and the upper nerve roots above the film, by the unchanged liquor. Only a small cylindrical portion, or girdle, of the spinal nerves is anesthetized. After observation of the effect upon the skin, exact elevation is controlled by addition or withdrawal of air, the limitation of the width of the anesthetic zone, by the addition of more solution. Contrary to the former technique, it has been shown that to limit the anesthesia caudally below the anesthetic zone, it is sufficient to produce only a liquor-free, air-free space, or vacuum, that is, to leave the dural sac empty and dry, which can be accomplished by the withdrawal of from 20 to 30 c cm of liquor, until the pressure in the sac is zero. By this method the dura becomes folded and places itself tightly around the cord and spinal roots. It has been shown that for a definite level film upon the liquor a few cubic centimeters of air, from 2 to 3, are sufficient. Although one can primarily influence the site of the injected fluid by the amount of liquor withdrawn, one can secondarily elevate the site cranially by increasing the amount of air introduced in the dural sac. The instrumentarium consists of air tight syringes of 5 and 20 c cm. content, rubber tubing with a small glass tube in the center, and a spinal needle with a lateral opening.

Four types of spinal anesthesia are differentiated

1. High spinal anesthesia, with its upper border at the level of the nipples and lower border in the region of the thigh. For this the patient is placed in an elevated pelvis position of 25 degrees. Puncture is made between the twelfth dorsal and the first lumbar vertebrae, and 30 c cm of liquor are removed until the pressure is zero and air is sucked in spontaneously. Three cubic centimeters of air are now injected and then 2.5 c cm of the solution through a needle introduced with the bevel toward the cranium, and then this is followed with another 2 or 3 c cm of air. The tube is now clamped and after five minutes the skin is tested for the extent and degree of the anesthesia. If the extent of the anesthesia is correct but the degree weak, then another 0.5 c cm of solution is injected. If the anesthetic zone is too low then another 2 or 3 c cm of air are injected and after another five minutes the skin is again tested. The dosage is individualized. The average dose of the $\frac{1}{4}$ per cent solution of percaine is 2 c cm from $1\frac{1}{2}$ to 4 c cm. In a prolonged operation it is better to give $\frac{1}{2}$ c cm more, at the very beginning. Kirschner emphasizes the fact that it is better if a little sensation remains in the upper zone of the operation area than if overdosage occurs. By means of high pressure local anesthesia these areas can be controlled easily. Kirschner always even if the spinal anesthetic is working perfectly injects a little local anesthetic on the parietal peritoneum near the incision and infiltrates the neighborhood of the solar plexus and the vagus nerve. The advantages of this procedure are amelioration of the postoperative wound pains.

2. Lower abdominal anesthesia from the upper border at the xiphoid cartilage to the lower border in the region of the leg. Puncture is made between the first and second lumbar vertebrae. Twenty cubic centimeters of fluid are withdrawn.

3. Leg anesthesia. In this type of anesthesia puncture is made between the second and third lumbar vertebrae and 10 c cm of liquor are withdrawn.

4. Saddle anesthesia for operations on the anus, rectum, perineum and vagina. Puncture is made between the third and fourth lumbar vertebrae or between the second and third. Five cubic centimeters of liquor are withdrawn. To quiet the mind of the patient an intravenous injection of scopolamine 0.005 eucodol 0.01 and phetamin 0.1 is given as soon as the needle is removed and the patient is on his back again, or the attention of the patient is diverted by means of ear phones to radio music or phonographic records. Unpleasant or dangerous complications such as respiratory difficulties were not observed during the last 2,000 cases. To stabilize the blood pressure the author gives 0.05 phetamin fifteen minutes before the spinal injection. In a few cases the patients must be prepared by giving cardiac tonics, intravenous glucose or blood transfusion. For circulatory and blood pressure stability it is advisable that the patient remain in an elevated pelvis position during the entire duration of the anesthesia. Experience has shown that this position makes the operative procedure especially in cases of stomach or gall bladder disease considerably easier. The best method of combating headache after spinal anesthesia is the intravenous administration of 20 c cm of a 10 per cent solution of calcium chloride or of a 40 or 50 per cent solution of glucose. It is also important that the patient's head be kept low in lifting him from the operating table and during his transport back to bed, and that the foot of the bed should be elevated during the first twelve hours following the operation. During the next twelve hours, however, the patient should remain in a horizontal position.

At the Kirschner clinic spinal anesthesia is replaced generally by narcosis considerably. Over 50 per cent of all operations are carried out under spinal anesthesia. Local anesthesia, spinal and high pressure anesthesia is employed in 75 per cent of all cases and only 25 per cent are placed under general narcosis, most of the latter being children.

(F. O. MAYER) LEO A. JUNKER, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Kornblum, K.: A Roentgenologist Looks at Sinus Disease. *Am. J. Roentgenol.*, 1937, 38 48.

The primary purpose of this contribution is to present an analysis of the various factors that play a rôle in the examination of the sinuses and in the interpretation of the resultant roentgenograms. The roentgen examination of the sinuses may serve to confirm the clinical diagnosis; it may aid in detecting factors responsible for the failure of sinus disease to respond to treatment, it occasionally reveals significant disease in the presence of a negative clinical examination, and finally it is of much value in depicting the anatomy of sinuses requiring operation.

The existing difference of opinion as to the value of the roentgen examination in sinus disease is probably due in large measure to the frequent variance between the clinical and roentgen findings, and might be obviated by proper correlation between the old methods of examination. The personal equation plays a more important rôle in sinus roentgenogram interpretation than it does in almost any other field of roentgenology, and one reason for this is that the results can rarely be checked accurately by clinical or other methods of investigation. Radical or conservative views regarding treatment of diseases of the paranasal sinuses may influence the significance attached to minor variations in density or structure. Since roentgen interpretation should be, above all else, objective and totally divorced from any extraneous influences and preconceived ideas, it is preferable to form an opinion of the roentgenogram before consulting the history of the case and then, by correlating the clinical and roentgenological data, arrive at a final conclusion. For an intelligent interpretation, such essential clinical facts as a brief statement as to the patient's chief symptoms, the duration of the condition, the positive clinical and laboratory findings, and, most essential, data concerning any operative procedures upon the nose or sinuses, should be available and taken into consideration.

Although the rhinologist may be quite proficient in the interpretation of sinus roentgenograms, he is apt to be misled by many factors and can be helped materially by the aid of a competent roentgenologist. Technical details of which he may have only a superficial knowledge cannot be fully appreciated except by one who is thoroughly familiar with them. Lack of standardization of procedures is partly the result of personal preferences of individual roentgenologists, each one employs the technique best suited to his purpose and therefore is most likely to make a correct interpretation.

The type of report given by various roentgenologists is apt to vary within wide limits, from purely objective variations of density to pathology with suggestions of therapy. Detailed descriptions of

anatomical and pathological changes may lead to unnecessarily long and complicated reports which frustrate their object, viz., to aid the clinician in intelligent diagnosis and therapy. The author believes that in all diseased sinuses a pathological interpretation should be attempted. An attempt should be made to recognize the changes as either acute or chronic, a statement should be made as to whether the opacity is due to hyperplastic tissue or the presence of an exudate, with or without evidence of a fluid level, and whether the disease is confined to the mucous membrane or also involves the bone. Osteomyelitis should be sought and polypoid formation of the mucous membrane should be reported. The possibility of neoplasms should constantly be kept in mind. Attention should be given to the intranasal structures, and abnormal changes in the nasal septum and turbinates should be reported. An opinion as to whether the changes present seem of clinical significance may be warranted.

Discrepancies between the clinical and roentgenological diagnoses may be due to a variety of causes. One of these is the fact that previous disease may leave roentgen evidence which simulates active pathology. Another not uncommon cause is the time interval between the clinical and roentgen examinations, during which conditions may have changed sufficiently to account for variation in the findings. Most of the difficulties may be overcome and errors reduced to a minimum by cooperation between the rhinologist and roentgenologist, especially in the less obvious and more difficult cases, where consultations should be sought.

ADOLPH HARTUNG, M.D.

RADIUM

Feller, A., and Langer, A.: Irradiation Measurements on Personnel Engaged in Radiological Occupations, and Some Protective Measures Against Gamma Rays (Strahlenmessungen an mit radiologischen Arbeiten beschäftigten Personal und Einige Schutzmassnahmen gegen γ -Strahlen) *Acta radiol.*, 1937, 18 547.

The establishment of new radiological institutes requires not only a good therapeutic equipment but also thorough and adequate protection, especially for the operating personnel who often enter directly into the irradiation field. The surroundings, which are not directly subjected to the danger of radium irradiation but only to the secondary irradiation, also require attention.

The International and the British Irradiation Protection Commission has reported that not more than a dose of 0.2 r can be borne without danger during a working day of eight hours. In the "Haus des Trostes" the walls of all the rooms in the radiology department are lined with lead plate from

12 to 15 mm thick and in addition are protected against secondary rays by a layer of wood 1 cm thick. The depository for storage of the radium has walls of lead 16 cm thick. The working tables and applicators also require protective appliances. It was then assumed that sufficient protective measures had been taken.

However, it was surprising to find that both a physician and a nurse showed marked blood changes. In the nurse the leucocyte count fell from 6 200 to 2 900 and in the doctor from 7 000 to 4 200. Morphologically, both showed a marked lymphocytosis and the nurse also showed a marked displacement to the left, a hyperchromic anemia, poikilocytosis and anisocytosis. At first 2 gm of radium were loaded into the moulages almost exclusively. A leaking radiophore with resulting escape of emanation into the air was at first suspected, but this was not the case. The impenetrability was tested every 12 months with a vacuum electroscope. By means of photometric tests it was found that the nurse received 1.23 r daily and the doctor 0.23 r both amounts being greater than the tolerance dose. It was found that the closet for the loaded moulages was not sufficiently protected and a depository was built which had the same protection against rays as that used for the storing of radium cells. With this precaution the tolerance dose in the rooms was not overstepped.

The danger of blood changes, however, was not yet obviated completely. One of the nurses died with an agranulocytosis from necrotic angina and sepsis. It was then found that the daily dosage of irradiation for the hand of the doctor was 0.016 r and for the chest 0.008 r for the hands of the nurses 0.168 r and for the chest 0.130 r. The most exposed part of the body was the hand. The appliance, which allowed a working distance of 10 cm, gave sufficient protec-

tion for the hands. With sufficient distance of the chest and the abdomen the working tables with suitable thicknesses of lead should have given complete protection. It was surprising to find that on examination of the different regions of the body the chest of the nurse was irradiated fairly intensively. One nurse received 0.210 r and another 0.106 r on the chest. The excessive r dosage originated from the application and removal of the moulages before and after the treatment.

In order to shorten the time of the preparation of the moulages as much as possible dippers were made for the filter, which made the slow pouring into wax unnecessary, and in order to accelerate their fixation to the body cloths with rubber bands and hooks were used. In the application of the moulages a lead wall which took the place of the roentgen apron served well. The wall consisted of 2 cm of lead and wood. It was oval in shape to protect the body. It was also perforated for manipulation with the hands. Its purpose was not only to catch about 70 per cent of the gamma radiation but also to place the source of irradiation on the patient as far as possible from the personnel. Distance is the most effective protection. Therefore the personnel was taught that in the room for applications not more than one patient with radium be allowed and that they must not come near the patient's for any length of time.

With the protective measures mentioned it was possible to diminish the dose which the personnel received almost to one sixth. The blood changes were no longer observed. A slight diminution of the leucocytes and a slight lymphocytosis disappeared after a short vacation. However, it is considered necessary that a six weeks vacation be allowed yearly for all workers with irradiation.

LOUIS NEWELL MD

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Marshall, E. K., Jr., and Walzl, E. M.: On the Cyanosis from Sulfanilamide. *Bull Johns Hopkins Hosp*, Balt., 1937, 61 140

The authors of this paper have attempted to analyze the chemical character of the cyanosis of patients treated by sulphanilamide. The prevalent opinion is that this cyanosis is due to sulphhemoglobinemia or methemoglobinemia. The chemical tests consisted of (1) a determination of oxyhemoglobin by saturation of the patient's blood with air, and (2) a determination of the total iron content of the blood by the dipyrilid color reaction. The difference in the two values gives the amount of non-functioning iron. The blood was also examined for abnormal pigments by the spectrophotometric method, and for the determination of hemoglobin and methemoglobin by the Van Slyke method.

A study was made of the blood of 7 patients with clinical cyanosis due to sulphanilamide therapy. The authors found that clinical cyanosis may occur without a diminution of the oxygen-carrying capacity of the blood or the presence of a non-functional blood pigment, such as methemoglobin. Though sulphhemoglobin or methemoglobin may cause cyanosis, it is probably not the main causative agent of the cyanosis of sulphanilamide therapy. The authors suggest that the cyanosis may be due to a black oxidation product of the drug which may be related to para-aminophenol.

BERNARD G. P. SHAIROFF, M.D.

Frank, L. J.: Dermatitis from Sulfanilamide. *J Am Med Ass*, 1937, 109 1011

In both cases which the author reports, the dermatitis from sulfanilamide appeared only after exposure to sunlight. After full development, it was not confined to the exposed parts, but the more serious involvement and intense edema were localized in these areas. It is known that a mild erythema resulting from the sun or other sources can hasten the appearance of and, for a time, localize, many dermatological conditions, including such infections as syphilis and smallpox.

Hypersensitivity created by the drug or some of its chemical reactions with hemoglobin may play a part in this type of toxic reaction. SAMUEL KAHN, M.D.

Kohn, S. E.: Anemia During Treatment with Sulfanilamide. *J Am Med Ass*, 1937, 109 1005

Since sulfanilamide or its derivatives contain the benzene ring, it may cause damage to the hematopoietic system. It is advisable to make blood counts frequently on all patients receiving this drug.

Another case of anemia with acute hemolysis and hemoglobinuria is reported by Kohn. The patient

was an infant of one year, ill with bilateral otitis media. Cultures yielded hemolytic streptococci. Following treatment with sulfanilamide a profound anemia with marked hemoglobinuria developed.

Certain individuals evidently have a predisposition to react to the dye. Most persons are apparently not unfavorably affected. If sulfanilamide is to be used constantly, its possible dangers must be kept in mind.

SAMUEL KAHN, M.D.

Bowers, W. F.: The Role of Distention in the Genesis of Acute Inflammation of Hollow Viscera. *Am J Med Sc*, 1937, 194 205

The fact that acute inflammatory changes may develop as a result of mechanical distention of a hollow viscus is elaborated on in this paper. It is believed that bacteria play a subordinate rôle in these changes and are chiefly important in the stimulation of fluid extravasation which increases the distention factor. Thus, acute cholecystitis may be based on a pressure-distention mechanism, and there is evidence that acute appendicitis is in most cases a form of closed-loop obstruction. Two cases of carcinoma of the sigmoid colon, with gangrene and perforation of the cecum resulting from gaseous distention, are cited in support of the distention theory.

Experiments on closed-loop intestinal obstruction indicate that distention is the important factor in the causation of gangrene and perforation. The importance of the hydraulic vicious cycle is demonstrated in experimental appendicitis. In the sterile ureter and kidney pelvis, experimental maintenance of a constant increased intraluminal pressure will cause acute inflammatory changes. Severe distention of the urinary bladder of the dog results in acute inflammation. The inflammatory changes of acute experimental glaucoma may be induced by osmotic imbalance.

WALTER H. NADLER, M.D.

Botreau-Roussel: Yaws (Le Pian). *J de chir*, 1937, 50 145

The author discusses the condition called yaws in detail and augments his article with 56 illustrations.

It was formerly thought that yaws originated in Africa and was transported to the Americas by the slave trade, but it appears now that the disease existed throughout the tropical zone long before the great explorations of the sixteenth century. The first observations were made in America. The disease was mentioned in numerous works, one of the earliest being the *Historia general e natural de las Indias* of Oviedo Valdez written in 1557. Père Labat has much to say of the disease in Dominique at a time when this island was untouched by either European colonists or African slaves. It seems never to have occurred in northern United States, Europe, nor the Mediterranean basin.

The predisposing causes are chiefly due to the mode of living. The rarity of yaws in Europeans as compared with certain colored races is explained by the wearing of clothing and the observance of elementary rules of hygiene. The rarity of the disease among the Moors, Touaregs and most of the Sudanese is explained in the same manner. The ideal terrain for yaws consists of a hot damp climate and an undernourished, filthy population.

The causative organism is the *treponema pertenue*, which was discovered by Castellani in 1905. It alone is found in the early papules which have not been scratched and infected secondarily. In old crusted lesions other organisms including large spirilla are present in profusion.

Morphologically, *treponema pertenue* is identical to the *treponema pallidum*. It has probably never been grown on artificial media.

The serological reactions of yaws and syphilis are likewise identical. Because of the close similarity between the two diseases they have often been confused. Moreover some authors believe that syphilis is a yaws that has been modified by treatment, race, climate, and mode of living in civilized countries. With this view the author has no patience because the two diseases are distinct in many ways, for example, the incubation period, the character of the initial lesion and the response to treatment. Moreover a syphilitic can be inoculated with yaws and a pianic with syphilis and lastly an individual can readily be reinoculated with yaws after treatment.

Transmission of the disease occurs by direct contact and can best be understood by one who has seen the infants of a negro village playing pell mell in the dust, all suffering from ulcers, yaws and scabies. The disease is never transmitted sexually. A wound is necessary as a portal of entry and flies are important vectors.

The course of the disease is divided into three stages: primary, secondary, and tertiary. However, this division is arbitrary because all three frequently exist at the same time. Even bone lesions often appear during the secondary or eruptive stage.

The initial lesion is seldom seen and for this reason most descriptions of it lack precision. It consists of a papule or group of papules from 1 to 7 cm. in diameter and occurs on the lower extremities in about 85 per cent of the cases. The lesion becomes considerably elevated and crusted. Farges, who has studied the initial lesion most carefully, describes it as a minute papule which in about five days reaches a diameter of 5 cm. and is covered by a parchment like skin. From six to eight days later it has become 2 or 3 cm. in diameter and is definitely granulomatous, that is to say a typical pianoma. From the fifteenth day vesicles appear about the lesion which gradually acquire the same character as the original papilloma and become confluent with it to produce the extensive mother yaws, *buba madre*, or *maman pian* as it is termed by the natives.

Histologically the initial sore consists of thickening of the epidermis due to intense hyperkeratosis and parakeratosis and to polymorphonuclear infiltration. In addition there is a plasma-cell infiltration of the corium into which the epidermal papillae extend deeply. The *treponema* can be demonstrated only in the surface portion of the lesion. The authors conclude that no initial chancre comparable to that of syphilis exists but simply an initial lesion of yaws no different from the eruptive lesions except to the extent that it may be modified by the wound serving as a portal of entry.

The generalization of the disease requires three to eight weeks and the secondary lesions last for several months. The eruption is preceded by fever, headache and osseous and muscular pains which largely subside as the skin and osseous lesions develop. At this time the Wassermann reaction becomes positive and the *treponema* can be demonstrated in the spleen, the peripheral blood and the bone marrow. However, except in the skin, the lymph nodes and the bones there are no organic changes.

The cutaneous lesions may appear all at once and be so numerous as to suggest smallpox. However, ordinarily they are quite discrete. The papules are widely disseminated but are most numerous at the flexor surfaces of joints and about the mouth, vulva and anus.

There are several clinical forms of eruption with depigmentation common to all. The papules may be closely set and produce white plaques which itch intensely, the *pian dartre* or lichenoid eruption.

The granuloma or raspberry like lesions or framboise are the most common and are individually like the primary lesion. Pruritis leads to scratching and secondary infection. The diameter is from 0.5 to 2.0 cm. and the height from 0.2 to 0.8 cm. When superficial ulceration has occurred removal of the crust leaves a red granular surface, hence the name yaws. Confluence with the production of serpygous and circinate lesions is common. Healing results in a supple scar in which depigmentation gives place to hyperpigmentation. Without treatment relapses occur for about eighteen months and sometimes for eight or ten years.

Granulomas of the plantar surfaces of the feet are particularly chronic and disabling and may persist a lifetime as large ulcers.

The lymph nodes of the body are enlarged and contain the *treponema*. Histologically they present only a banal inflammatory hyperplasia.

Osteoperiostitis is almost constant and appears during the eruptive stage and in the course of time leads to striking deformities. It develops slowly and is associated with much pain. These lesions may regress spontaneously at any time or progress for long periods. Most commonly affected are the phalanges which present the aspects of spina ventosa. In the extremities there is diffuse thickening of the bone at first and later large exostoses. Lesions of the face, particularly of the upper maxilla known as *goundou* are among the least common but are the



Fig 1 Untreated voluminous lesion of the entire upper maxilla (goundou)

most striking (Figure 1), they are tumor-like masses which reach huge proportions. The microscopic and roentgenographic examinations reveal a proliferative periostitis with rarefaction of the bone. The bones of the extremities show widening of the medullary cavity which has suggested osteitis fibrosa cystica to some authors.

Tertiary lesions, properly speaking, consist of ulcers and occasionally gummata. If they are not treated, they progress for years and, like a syphilitic lesion, spread and heal. The histological structure is not characteristic.

Gangosa is a destructive nasopharyngitis which breaks down the soft palate, the hard palate, and the nose (Figure 2). The upper lip and the dental arch are respected.

Visceral lesions have not yet been sufficiently studied, and confusion with syphilis exists. Some authors affirm and others deny that vascular changes occur. Much the same situation obtains with regard to nervous lesions.

A differential diagnosis of yaws has to be made only from syphilis. The chief points are as follows.

In yaws the initial lesion is pruriginous, non-genital, and non-congenital, secondary lesions are exfoliative, papular, granulomatous, and itching, the treponema are confined to the epidermis, the vessels are not involved, lymphadenopathy is marked, but the treponema can rarely be demonstrated in the nodes, there are no lesions in the mucous membranes, there is no alopecia, there are no ocular lesions, bone lesions are hypertrophic rather than necrosing, visceral lesions are rare, response to treatment with



Fig 2 Gangosa accompanied by cutaneous, osteoperiosteal and articular lesions with muscular retraction

bismuth and arsenicals is extremely rapid. Mercury has little effect.

The prophylactic treatment of yaws consists in the isolation of the patient and the administration of arsenicals or bismuth. Prompt care should be taken of all cutaneous abrasions and the patient should wear clothing. The disease rapidly disappears from all regions where the natives adopt a manner of living which approaches that of Europeans. It no longer is found in Florida, the Barbados, nor British Guiana, but persists among the more primitive masses of people, such as inhabit parts of Africa.

The choice of drug is governed in large part by the simplicity of administration and cost because in all regions where yaws exists the patients are numerous and dispersed and the medical personnel inadequate. Stovarsol administered by mouth is effective, but has disadvantages in that the drug becomes an article of commerce among the natives, who employ it as a panacea. Under medical control neoarsphenamine is preferable but the number of patients reached is restricted. Most satisfactory and least expensive is bismuth salicylate in oil which is injected subcutaneously or intramuscularly.

The period of treatment necessary for a durable cure is about two months, or 10 injections of 6.5 gm of neoarsphenamine, and 12 of bismuth. This treat-

ment must be lengthened by six or ten months when there are osseous lesions. Between the series of injections potassium iodide is of value.

Surgical treatment involves resection of exostoses plastic operations on the face and orthopedic treatment of curved tibiae. For this no specific indications can be given. ALBERT F. DE GROOT, M.D.

Miller H. E., and Collins C. G. Echinococcus Disease. *Ann Surg.* 1937 105 836

Echinococcus or hydatid disease is a menace to public health in Pomerania, Mecklenburg, Bavaria, Switzerland, certain provinces in Italy, parts of France, Greece, Armenia, Yugoslavia, the steppes of Russia, and Turkey. In Iceland it is the cause of one seventh of all deaths. In Australia and New Zealand it is quite common. In South America the incidence is high and the leading surgeons are well informed on echinococcus cysts.

In North America the disease is more prevalent than commonly supposed. To date 509 cases have been reported in the literature of the United States and Canada.

The authors report what they believe to be the first case of echinococcus cyst of the uterus in the United States. It was removed from a native born colored woman aged twenty-two during a pelvic operation for fibroids. Careful search for other foci was made with negative findings. The cyst was removed in its entirety with no recurrence to date. GEORGE A. COLLETT, M.D.

Beer E., King F. H., and Prinzmetal M. Pheochromocytoma with Demonstration of Pressor (Adrenalin) Substance in the Blood Preoperatively During Hypertensive Crises. *Ann Surg.* 1937 106 85

To date there have been reported only 6 cases of successful removal of pheochromocytoma in the adrenal gland. There also have been reported 2 cases in which the tumors were located in the sympathetic distribution outside of the adrenal gland.

The new case here reported is that of a single white woman aged twenty-six years. The history dates back nine years at which time the patient first noticed sensations of mild fatigue, throbbing headache, and excessive perspiration. Diagnosis of hyperthyroidism was made and a subtotal thyroidectomy was performed without relief of the symptoms. The pathological diagnosis was adenocarcinoma of the thyroid gland.

At the time of admission to the hospital the symptoms were nausea and a generalized headache. The hair felt as though it were standing on end and being pulled. There was a precordial throbbing with exaggerated pulsations of the blood vessels of the neck. The patient would become dyspneic and gasp for breath. During these spells all the digits of both hands and to a lesser extent the toes suddenly would become perfectly white, change to a purple color, and soon become an angry red. For three years she had noticed that the distal portion of the

upper and lower extremities and the tip of the nose were constantly cold. Other cutaneous manifestations were a reddish cyanotic discoloration of the skin above the ankles and a reddish purple mottling and reticulation of the skin of the arms and legs, and especially around the knee joints. These symptoms soon retarded leaving the patient drenched with perspiration and fatigued. The total elapse of time for one of these spells was approximately five minutes. All these symptoms had been growing progressively worse during the past seven years. Up until about three months before admission these crises would occur about once a week but they increased in frequency and severity until upon admission to the hospital, they occurred about every half hour. Over a period of four years the patient had lost 18 lbs. in weight although she always had an excellent appetite.

The patient's mother and one sister had undergone thyroidectomies. An older sister who had died at the age of twenty-eight years had had a thyroidectomy performed and her clinical picture closely resembled that of the present patient.

Physical examination showed an underdeveloped woman who perspired freely. The ocular fundi showed very slight thinning of the arteries with increased light reflex. A rough systolic murmur was heard at the base of the heart. The radial arteries were moderately sclerotic. The blood pressure was 230/180. There was a slight fine tremor of the outstretched fingers.

Laboratory tests showed the blood urea to be 25 mgm., the blood sugar 175 mgm., the blood cholesterol 525 mgm., and the blood sodium 133.5 milli equivalents. The basal metabolic rate was plus 60, plus 39, and plus 27 per cent. The electrocardiogram showed a sinus tachycardia with a rate of 115 per minute, left ventricular preponderance, QRS of high voltage, slight depression of the R-T transition in leads I and 2, an upright T. Q. Roentgen determinations showed diminished peripheral oscillations, there being only slight oscillation at the level of the ankle. The skin temperature as determined by the dermotherm was diminished in the peripheral portions of the body. The Janney test showed a fasting blood sugar of 65 mgm. per 100 ccm. with a rise to 230 mgm. in one hour followed by a fall to 50 mgm. at the end of three hours. Ten units of insulin were given hypodermically when the fasting blood sugar was 105 mgm. per 100 ccm. At the end of one and a half hours the patient went into a hypoglycemic shock, the blood sugar being 15 mgm. per 100 ccm. The intravenous administration of glucose promptly revived her. There was an unusual elevation in blood pressure following the subcutaneous administration of 2 minims of adrenalin (1 to 1000) indicating abnormal sensitivity. Examination of the urine for the presence of hormones showed a slight amount of gonadotropic hormone but no estrin.

When the systolic blood pressure was over 300 during a hypertensive attack, 200 ccm. of blood

were removed from the antecubital vein. Using a modification of the Pissemaki method of perfusion of the denervated ear of the rabbit and the blood of a control subject, a test was made for the presence of pressor substance in the patient's blood. A maximum of thirty-five minutes elapsed between the phlebotomy and the experiment. The result of this experiment was that a remarkable pressor effect was demonstrated in the plasma of the patient under observation.

A perirenal insufflation of air was carried out. Roentgenograms of the kidney areas taken immediately showed the left kidney with a large adrenal tumor situated directly above it. The right kidney was apparently normal.

The large adrenal tumor and the left kidney were removed. The patient withstood the operation very well and made an uneventful recovery.

The pathological report disclosed that the specimen consisted of a well encapsulated globoid mass weighing 290 gm., measuring 9 by 9 by 6 cm. Microscopic examination revealed the tumor to be a pheochromocytoma. Further studies of the tumor revealed no gonadotropic hormone in the tumor tissue.

The patient's condition was definitely improved following the removal of the tumor. There were no more systemic episodes and the blood pressure remained at 125/85. The previous cutis reticularis and discoloration of the skin above the ankles were no longer present. The tachycardia was lessened. The eye grounds still showed slight thinning of the vessels.

Laboratory data after operation showed that the basal metabolic rate was minus 1 and minus 17. Chemical examination of the blood showed the blood urea to be 11 mgm., the blood sugar 75 mgm., and the blood cholesterol 270 mgm. The electrocardiogram was unchanged. Oscillometric measurements still showed a diminution of peripheral pulsations. There was an increase in the peripheral skin temperature. The Janney test showed a flat curve for the blood sugar. No pressor substance could be demonstrated upon repetition of the perfusion experiment. Raynaudlike symptoms were still occasionally experienced by the patient.

RICHARD J. BLUNNETT, JR., M.D.

Usadel, W.: On the Question of the Benignity or Malignancy of Myxomas (Zur Frage der Gut- oder Bösartigkeit der Myxome). 61. Tag d. deutsch. Ges. f. Chir., Berlin, 1937.

From the clinical standpoint, malignant tumors can be divided into two groups: the one is characterized by a somewhat regular clinical course, as in cases of cancer of the breast or the rectum, and the treatment in these cases has led to an approximately normalized conclusion. On the other hand, not too rarely we have to deal with tumors of predominantly connective tissue origin, which are not yet completely clarified from the histogenetic standpoint. In these cases, particularly, the clinician still

feels quite uncertain with regard to the therapeutic procedure. Among these tumors, the myxomas of the soft parts seem to be neglected from the surgical standpoint, particularly because of their peculiar clinical behavior. Isolated case reports on myxomas, myxofibromas, and myxosarcomas are occasionally found in the German and foreign literature. Koenig and Seifert, in their work that appeared a few days ago on "The Nature, Recognition and Treatment of Cancerous Disease," found themselves unable to discuss "the operative treatment of sarcoma, both of the bones and the soft parts," from a uniform standpoint. The author reports only on myxomas of the soft parts, and not on myxomas of the bones and myxosarcomas, which have been investigated relatively often and which must usually be considered very malignant.

The author discusses the histological character of myxomas in great detail. The simple myxomas are judged variously in regard to benignity and malignancy. Aschoff, for example, in his textbook considers the myxomas in general as benign tumors which rarely recur or produce metastases. According to Dietrich, myxomas with abundant mucous substance may readily produce metastases. In the presence of a myxomatous tumor even the biopsy section will not always give clear evidence regarding the benignity or malignancy, and in these cases the decision seems to depend upon the personal opinion of the pathologist. This fact may be of serious import to the bearer of the tumor, as the question of the necessity of a more or less disfiguring operation may arise. The decision must again be based upon a definite foundation of clinical experience. This foundation does not appear to be available as yet to the author. He therefore believes it to be necessary and proper to present this question before the great forum of the Deutsche Gesellschaft fuer Chirurgie, on the basis of 25 cases alone, observed during the last ten years at the Surgical Clinic of Tuebingen, which, insofar as the patients were still alive, were recently followed up. Accordingly, the myxomas and myxosarcomas are not as rare as it is generally assumed in the literature.

In regard to the histological structure of this tumor a thorough study of the subject was made at the Pathologic Institute of Tuebingen and except for a few of the older cases, the diagnosis was made by the Director of the Institute, Dietrich. The original tumors in these 25 cases were as follows: 7 pure myxomas and 4 fibromyxomas, 11 so-called benign myxomas, 8 myxosarcomas, 4 myxofibrosarcomas, 1 myxomatous spindle-cell sarcoma, and 1 myxo-osteoid sarcoma. Their localizations were as follows: 4 in the leg and foot, 10 in the thigh, 2 in the arm, 1 in the forearm (17 in the extremities), and 8 in the back, buttocks, abdominal wall, and inguinal region.

The author discusses the reaction of those tumors which were designated as benign at the first operation. Of these simple myxomas and fibromyxomas, only 3 did not recur and metastasize after radical

ment must be lengthened by six or ten months when there are osseous lesions. Between the series of injections potassium iodide is of value.

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When the systolic blood pressure was over 300 during a hypertensive attack 100 c.c. of blood

quate intake of fluid, the administration of dextrose, relief of distention, and the administration of digitalis, strychnine, or other cardiac stimulants

ALTON OCHSNER, M D

DUCTLESS GLANDS

Westman, A., and Jacobsohn, D.: *Experimental Investigations on the Significance of the Pituitary-Midbrain System in the Production of Gonadotropic Hormones of the Anterior Lobe of the Pituitary Gland* (Experimentelle Untersuchungen ueber die Bedeutung des Hypophysen-Zwischenhirnsystems fuer die Produktion gonadotroper Hormone des Hypophysenvorder lappens) *Acta obst et gynec Scand*, 1937, 17 235

In a review of the literature, the various views regarding the periodic changes of the gonadotropic function of the pituitary gland are given. There is a possibility of a primary rhythm in the pituitary gland with a varying secretion of the follicle-ripening and the corpus-luteum-forming hormones. Experiments also suggest that the ovary influences the production of gonadotropic hormones of the pituitary gland. Finally, it is also conceivable that a cerebral sexual center regulates the function of the pituitary gland through a nervous mechanism.

The pituitary gland is in part supplied with nerves that come from the hypothalamic centers and course through the pedicle, and partly with sympathetic nerve fibres from the carotic plexus. Former investigators have shown that the pituitary gland is not essentially disturbed in its production of gonadotropic hormones by sympathectomy.

In the authors' experiments, the effects of a division of the pedicle of the pituitary gland on the ovarian functions of the rat and the rabbit were studied. In the rat, a folded paper of suitable size was introduced through a temporal trephine opening in such a way that the pedicle of the pituitary was divided thereby. The paper then remained as a barrier between the brain and the pituitary. In the rabbit the pedicle was destroyed by electrocoagulation. The results were as follows:

1. After division of the pedicle the ovaries atrophied and gradually retained the same appearance as after a radical hypophysectomy, in spite of the fact that the pituitary gland showed no injuries, in both the rats and rabbits.

2. When the pedicle of the pituitary gland in the rabbit was burned immediately after the copulation, the follicles did not rupture in the normal manner and did not transform themselves into corpora lutea.

3. When the burning was done later than two hours after the copulation, corpora lutea developed but their time of function was shorter than normal.

4. Copulation a short time after the division of the pedicle of the pituitary gland was not followed by ovulation.

5. Electrical stimulation of the brain immediately after the division of the pedicle did not lead to ovulation, in spite of the fact that rupture of the follicles

regularly followed a similar stimulation in control animals.

6. Although the granulosa cells of the ripe, unruptured follicles following a hypophysectomy degenerated shortly after the copulation, they remained intact in the corresponding experiment with division of the pedicle, in rabbits.

From the last observation it appears that the gonadotropic hormones of the pituitary gland are not transported through the pedicle of the pituitary gland in the brain, but that they reach the general circulation directly. All of the experiments show that nervous impulses which reach the pituitary gland through the pedicle of that gland from the brain have a decisive significance in the production of gonadotropic hormones in the pituitary gland.

LOUIS NEUWELT, M D

Jacobsen, A. W., and Cramer, A. J., Jr.: *Clinical Results of Anterior Pituitary Therapy in Children*. *J. Am. M. Ass.*, 1937, 109. 101.

Ten cases of children who have received therapy with anterior pituitary extract are reported. These cases were selected as illustrative of the kind of results that may be obtained in cases of dwarfism, infantilism, hypogonadism, and certain types of obesity when the response to endocrine treatment is favorable.

Experience has shown that desiccated thyroid administered in conjunction with extract from the anterior pituitary gland usually produces more rapid improvement than the extract given alone. Patients who have failed to respond when thyroid alone was given have improved rapidly on the combined therapy.

The article is illustrated with views of patients before and after treatment.

JOHN J. MALONEY, M D

Luisi, M.: *Relationships Between the Ovary and the Islands of Langerhans in regard to Carbohydrate Metabolism* (I rapporti fra l'ovaio e le isole del Langerhans considerati rispetto al metabolismo degli idrati di carbonio) *Riv. ital. di ginec.*, 1937, 20 276.

The discordant conclusions as to the relationship between the ovaries and the islands of Langerhans, as well as the scarcity of clinical and experimental observations on the relation of the gonads to carbohydrate metabolism prompted Luisi to undertake the studies here presented.

His questions were "Is ovarian activity in regard to sugar analogous or antagonistic to insulin, and after bilateral oophorectomy is there an intervention of the insulin function or of the sympathicotonic group of glands?"

His method was to take, for each patient, two blood-sugar curves following the administration of insulin: the first, pre-operatively, the second, a variable number of days after operation. After a preliminary determination of the blood sugar following a twelve-hour fast, 10 units of insulin were given

operative removal during a 4 year period. All the others recurred. The recurrence appeared after varying lengths of time, often only a few months after the first removal, usually two years after the first operation, and in 1 case the recurrence was found only after 6 years following the first intervention. The fact that recovery may occur even after repeated operations for recurrences when a really radical operation was done, seemed to be significant to the author. He was also able to determine and this is especially emphasized by the author that even simple myxomas and fibromyxomas may produce metastases when they recur, in which case the recurrence could still be classified histologically as a simple myxoma. The patients succumb to these metastases of benign or seriously affecting tumors in a relatively short time. Even without producing any metastases a simple myxoma may continue to grow as a recurring tumor and lead to general marasmus by compromising vital organs. It is noteworthy that the recurrences always appear more rapidly after each operation as is usually reported in the literature. It is interesting therefore that a tumor originally considered histologically as absolutely benign may assume the character of a myxosarcoma on recurrence.

In the cases in which even the primary tumor was considered sarcomatous, 5 patients presented neither a recurrence nor metastases after thorough local operative removal of the myxosarcomatous tumor. This freedom from recurrence and metastases respectively has already existed for from 3 1/2 to 6 1/2 years. In 1 case a myxofibrosarcoma in the old field of operation did not recur but 4 years later a metastasis in the vertebral column occurred and required a chordotomy. Besides fibromyxomatous parts this metastatic tumor also showed parts of an osteoid sarcoma of great immaturity. The author calls special attention to the fact that with the appearance of a recurrent sarcomatous myxofibroma of the foot renewed radical operation may result in recovery. One case is now free from recurrence ten years after the second operation but this occurrence is rare. In the majority of the cases however the myxosarcomas recur and produce metastases and the patients die after a more or less extended period.

The conclusions to be drawn from these findings are:

1. The myxomatous tumors of the soft parts may be considered truly malignant from the clinical standpoint. Of the 23 cases upon which these determinations are based 20 terminated fatally from myxomas during an observation period of ten years. Among these there were 2 which at the beginning were considered histologically as absolutely benign.

2. The histological finding cannot be relied upon even when, as Oberdorfer emphasized at the meeting of the Association of Bavarian Surgeons in the year 1931, careful histological search leads to a definite decision as to the benignancy or malignancy of the tumor, as even so-called simple typical myxomas

may produce metastases. The transition of a benign mucous tumor into a myxosarcomatous growth is possible especially in a recurrence. So-called benign myxomas may also become malignant because of the fact that they, partly as a recurrence, grow into giant tumors, destroy and compromise the activity of other organs and lead to marasmus and death of the tumor-bearing individual.

3. Every simple myxoma and every recurrence must be extirpated as radically as possible for into healthy tissue. Only in this way can recovery be assured. If this is impossible or if a recurrence shows a transition from a primary myxoma to sarcoma, amputation should be done as far as the seat of the tumor allows.

4. Even with a still relatively well circumscribed myxosarcoma a local extirpation may be justified provided it can be done radically enough. Otherwise and with the appearance of the slightest sign of a recurrence, amputation as far as possible is demanded.

5. Roentgen therapy alone of myxomas is uncertain in result and therefore contraindicated. The favorable time for radical removal of the tumors may be missed. Postoperative irradiation may well be recommended. Louis Nauwels M.D.

GENERAL BACTERIAL PROTOZOAN AND PARASITIC INFECTIONS

Kolmer J. A. The Etiology, Prophylaxis and Treatment of Surgical Septicemia. A Discussion of the Principles Involved. *Arch. Otolaryngol.* 1937 25 59.

The author states that septicemia is the result of virulence of the infecting organisms, a deficiency on the part of the clearing mechanism, or a combination of the two. By virulence is meant the capacity of the organisms for producing toxins and their invasiveness or their capacity for spreading rapidly in the tissues. The clearing mechanism consists of phagocytosis and antibodies in the blood, particularly opsonins and agglutinins. However the author adds that a direct bactericidal action of the plasma and the presence of natural antitoxins play important roles in the clearing mechanism.

The author stresses the importance of adequate but skillful and judicious drainage of the primary and secondary foci of infection in both the prophylaxis and treatment of septicemia. He recommends the use of biological therapy which includes the early administration of large amounts of anti-streptococcal serum or staphylococcus bacteriophage by intravenous injection as well as transfusion of normal or immune blood every three days. For the chemotherapy of septicemia due to the hemolytic streptococcus he recommends the oral administration of sulfamidamide and intravenous or intramuscular injection of a derivative of protosil. For staphylococcal septicemia he recommends the intravenous injection of Prager's solution of iodine and metaphen. The important adjuvant measures embrace an ade-

INTERNATIONAL ABSTRACT OF SURGERY

MARCH, 1938

SURGERY AND THE BASIC SCIENCES

THE APPLICATION OF RECENT CONTRIBUTIONS IN BASIC MEDICAL SCIENCES TO SURGICAL PRACTICE

A C IVY, M D, Chicago, Illinois

SULPHANILAMIDE

SULPHANILAMIDE has proved to be an extremely effective chemotherapeutic agent in the treatment of streptococcic and gonococcic infections. Many recent papers have appeared which indicate that it is effective also in combating experimental pneumococcic infection. Cooper and Gross (1), in a series of articles, have reported good results in treating rats infected with pneumococci of Types I, III, and IV, Kreidler (2) in rabbits injected endermically with Type I, and Schmidt (3) in mice inoculated with Type XIV. The lung involvement is apparently not decreased, but treatment permits the animals to survive the associated "toxemia." Sulphanilamide appears to be as effective as specific antisera, although the therapeutic effect is not enhanced by including antisera in the treatment. Kelson (4) finds sulphanilamide ineffective in the treatment of monkeys inoculated intranasally with polyomyelitis.

Barlow (5) reports that oral therapy with sulphanilamide compounds is more effective than parenteral. He states that prontosil is from 1.4 to 1.8 times more effective than prontosil in experimental streptococcic infections, although prontosil has a narrower range between the therapeutic and toxic doses. Disulon has been proved to be the most effective and the least toxic of the three sulphanilamide compounds which were studied.

Nathan Smith Davis Professor of Physiology and Pharmacology, Northwestern University Medical School

Marshall, Emerson, and Cutting (6) have determined the sulphanilamide renal clearance in the dog, and found it to be from 20 to 30 per cent of the creatinine clearance. The drug is therefore reabsorbed to some extent by the renal tubules. The clearance is independent of the plasma level, but is increased by the rate of urine flow. These investigators also report (7) that in dogs and man sulphanilamide is distributed almost uniformly throughout the body, except for osseous and adipose tissues. The concentration in the cerebrospinal fluid parallels that in the blood, an observation also made by Mellon and Bombas (8) in cases of successfully treated streptococcic meningitis. This high degree of penetration of sulphanilamide is probably an important factor in its therapeutic effectiveness.

Although the acute toxicity of sulphanilamide has been determined, the first study to come to our attention on the pathology produced by continued administration of non-fatal doses is that of Hageman (9). In mice exposed to various doses, histological examination revealed no pathology in the kidney or liver. Deposition of hemosiderin in the spleen was noted, however, which suggested increased blood destruction. This process appeared to continue after withdrawal of the drug. Excessive numbers of eosinophils were observed in the bone marrow, which suggested the possibility of an allergic type of action, although no reactions were detected at the time of administration of the drug.

hypodermically, and blood samples were taken at intervals of thirty sixty one hundred and twenty and one hundred and eighty minutes afterward. The method was applied to a series of patients having double oophorectomies. Control series consisted of patients with hysterectomy in which one or both ovaries were left, patients with operations which do not ordinarily affect the blood sugar such as perineal lacerations, and patients who were operated upon after the menopause.

The results showed that after bilateral oophorectomy the hypoglycemia following the injection of insulin is less marked and the return to normal more rapid than in the controls. Hysterectomy with unilateral ovariectomy does not affect the mechanism of blood sugar regulation. This group contained several cases of malignant uterine tumors and ovarian cystomas. After the menopause the postoperative curve of hypoglycemia following the administration of insulin varies little from the analogous preoperative curve.

Lusk's interpretation of these findings is that the tendency to sympathicotonia after bilateral oophorectomy as evidenced by the blood sugar curve speaks for an antagonism between the sympathetic system and the ovary, i.e. for an action related to that of insulin. In his opinion, the greater part, if not all of the parasympathetic reaction which restores equilibrium after removal of the ovaries is attributable to the compensatory activity of the islands of Langerhans. After the menopause however, this pancreatic compensation is absent because of the profound changes in the endocrine system and hence the blood sugar curve after operation shows a more or less manifest tendency toward sympathicotonia. What was a transitory condition in younger women becomes permanent in older women.

These experiments show that there is a close collaboration between the islands of Langerhans and the ovaries and that its demonstration in regulation of the blood sugar has a symptomatic value.

M. E. Moxer, M.D.



ment of the corpora lutea, which produce progesterone. Estrone and possibly progesterone were thought to depress temporarily the elaboration of follicle-stimulating hormone from the pituitary gland. Removal of this depressing effect initiates the next cycle. This concept may be *slightly* changed as a result of recent work. It is reported by Myers, Young, and Dempsey (21) that the rate of growth of the follicle in the guinea pig is practically constant during the first twelve days of the sexual cycle and that just before estrus a sudden marked enlargement occurs. This sudden growth was shown by Foster and Hisaw (22) to be the effect of the luteinizing hormone of the anterior lobe of the hypophysis. Dempsey (23) reports that the basal growth rate of the follicle is altered neither by male and female sex hormones, nor by pregnancy, but is abolished by hypophysectomy, whence he concludes that it is controlled by a *constant* production of follicle-stimulating hormone from the pituitary gland. The sudden enlargement which culminates in ovulation is due to a sudden discharge of the luteinizing hormone, a discharge which he finds is prevented by progesterone and by pregnancy. He believes, therefore, that the cyclic nature of the phenomena of estrus derives, not so much from a variable secretion of follicle-stimulating hormone as from a periodic discharge of the luteinizing hormone, this discharge being brought about probably by estrone (Victor and Anderson, 25) and inhibited by progesterone.

A sudden discharge of gonadotropic hormone (anterior lobe of the hypophysis) has been noted by two groups of investigators who have detected the hormone in the urine on the day preceding ovulation in normal women (19, 24). This would appear to correlate well with observations in the lower animals as mentioned above. However, one cannot be too cautious when correlating findings in man with those in the lower animals. *One should never forget that of all the phenomena of physiology, those concerning reproduction show the greatest species differences.*

IMPLANTATION

Brewer (27) has published a careful study of a fifteen-day-old human embryo with its accompanying uterus. He noted that the endometrium (vera) distant from the embryo showed a microscopic appearance identical with that of a fully developed endometrium of an ovulatory cycle. At the site of implantation, however, the endometrium had the appearance of a beginning menstruation of an ovulatory cycle. (For a recent review of the endometrial changes during men-

struation, see Bartelmez, 28.) All of the necrosis in this area could not be attributed to the activity of ferments from the trophoblast. Some of the changes were due to vascular activity on the part of the endometrium, exactly as found in beginning menstruation, namely, constriction at the level of the myometrium of the spiral arteries which nourish the superficial mucosa. *The endometrium, therefore, appears to "menstruate" locally at the site of implantation*, at the time when menstruation would have appeared had impregnation not occurred. Brewer believes that the purpose of this localized bleeding is to provide nourishment for the embryo, which has not as yet established an adequate circulatory connection with the uterus. Bleeding at this time is well known among lower animals under the term, "placental sign." This same phenomenon occurs in man as this work shows. This sign in an exaggerated form accounts for the frequently observed "spotting" or menstruation at the first period following conception in women.

OVULATION POTENTIAL

It has been reported that in rabbits the process of ovulation is reflected by a sudden marked change in the electric potential between the vagina and abdominal wall (29, 30). This method of investigation has been applied successfully to a woman who was to undergo an operation (Burr, Musselman, Barton, and Kelly, 31). The characteristic change of potential having been observed, the woman was operated upon and a fresh corpus luteum was found on the ovary. Reboul, Davis and Friedgood (32) showed in the rabbit that the change in potential occurred within a few seconds after ovulation, the latter being directly observed by means of a laparotomy. They also report that the contents of the developing follicle are electronegative with regard to the surrounding tissues. Since the typical change in potential is not observed if the rupturing ovary is electrically insulated except for its blood supply, nor if the follicular contents are removed and spilled into the abdomen, the authors conclude that the ovulation potential is due to the establishment of electrical contact between the electronegative interior of the ovary and the surrounding tissues, which makes the latter (the abdominal wall) more negative with respect to the vagina.

Although the long-debated question as to whether new germ cells are formed in the adult ovary or whether they are all preformed at birth is not directly related to this subject, it is interesting to observe that Allen and Creadick (33) have

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The reviewer cannot resist the temptation to correlate with these findings the evidence concerning the production of estrone as Reynolds does in his article, and also the new evidence concerning the excretion of progesterone during pregnancy. It has been shown by several workers that the elimination of estrogens in the urine increases progressively during pregnancy (36, 37). Up to within one or two weeks of delivery practically all of the hormone is in the combined form. During the last two weeks the combined form rapidly declines accompanied by an equivalent increase in the free form which reaches a peak as labor begins. Immediately after delivery the excretion falls to low level.

The increase in estrone excretion occurs at the time when uterine growth is inhibited according to the observations in rabbits. Since estrone increases the motility of the uterus it will be seen that the motor effect of the hormone reaches its

maximum at the time of labor, and would appear to be causally related to it.

Browne, Henry and Venning (17) have followed the excretion of sodium pregnandiol glucuronide the inactive excretory form of progesterone, during pregnancy and found that it also is excreted in progressively increasing amounts up to within twenty-four hours of delivery when it disappears almost completely from the urine. *Progesterone is known to exert an inhibitory action upon uterine motility and would seem to be responsible for holding in check the two factors which tend to empty the gravid uterus namely, the distention and motor effect of estrone.* Just before labor when the inhibitory action of progesterone is withdrawn, the other factors would seem to initiate labor.

It has been observed (13, 37) that during the increasing excretion of estrogens during pregnancy, there is a discernible twenty-eight-day fluctuation in the quantity eliminated. The persistence of this cyclic phenomenon may be responsible for the precipitation of labor at the usual 'ten month' period after conception. Although much work would be necessary to substantiate the above hypothesis concerning the natural termination of pregnancy, it seems at present to be an attractive theory.

The above discussion should not be interpreted to mean that the ovary is necessarily involved in the normal initiation of labor. The uterine growth is not dependent on the ovary, nor is the ovary a significant source of estrogens during the greater portion of pregnancy. The available evidence at present indicates that the factors initiating and controlling normal labor are resident in the uterus itself or in its contents including the placenta.

INTERSEXUALITY

Because intersexuality has previously been produced experimentally only among lower forms our limited knowledge of this type of abnormal development among mammals has necessarily been drawn from a study of rare and spontaneously occurring forms mainly the freemartin. Greene and Ivy (38), however, have reported the successful production of varying degrees of 'hermaphroditism' among rats by subjection of the pregnant mother to the influence of testosterone at the period of gestation during which the fetuses are undergoing sex differentiation. The male offspring are apparently not significantly affected but the females show all degrees of intersexuality. Structures which histologically resemble the prostate and seminal vesicles are found. Kerenchevsky (39) also observed the development of

the rudimentary female prostate into an apparently normal male prostate under the influence of testosterone. Although evidence of inhibition of muellerian-duct derivatives in the "hermaphroditic" litters is as yet meager, exaggerated development of wolffian-duct derivatives is uniformly present, according to Greene and Ivy.

This experimental production of virilism by the administration of testosterone becomes of interest when it is recalled that androgenic substances have been demonstrated in the urine of pregnant women and in the placenta (40, 41, 42), and that the adrenal cortex elaborates androgen as demonstrated by the maintenance of sex characteristics in castrated male rats by the injection of adrenotropic extracts (43, 44).

Hamilton and Hubert (45) have devised a simple clinical test to differentiate true from false cryptorchidism. In order to induce relaxation in those muscles in which contraction causes retraction of the testes, heat is applied to the genital region of the patient who is comfortably disposed in the supine position with legs apart. Apprehension must be completely relieved by conducting a preliminary mock examination, by complete privacy, and by avoiding any contact capable of eliciting a cremasteric reflex. If under these conditions of relaxation, the testis does not descend either spontaneously or after increase of the abdominal pressure, it is considered to be truly cryptorchid. By this procedure, 10 of 16 cases submitted as cryptorchid, were found to be false. Failure to differentiate between the two types may be partly if not largely responsible for contradictory reports on the effect of therapy in this condition.

SEX HORMONES ARE NOT SEX-SPECIFIC

Hill (46) has reported that ovaries grafted into the ears of castrated male mice will maintain the seminal vesicles and prostate in a normal condition for as long as one hundred days. This can mean only that the ovaries secrete an androgenic substance. Of course, clinically it is known that arrhenoblastoma is accompanied by virilism.

Numerous investigations have recently shown that testosterone resembles progesterone physiologically as well as chemically. Like progesterone, testosterone suppresses the estrus cycle (Nelson and Merckel, 47, Wolfe and Hamilton, 48, Leonard, Sager, and Hamilton, 49), and the menstrual cycle in monkeys (Hartman, 50), inhibits uterine motility (40), prevents castration atrophy of the uterus with or without progestational changes (40), delays parturition and maintains pregnancy after "early" castration (Scia-

piades, 51), and stimulates mammary development (Astwood, Geschickter, and Rausch, 52). It differs from progesterone in that the presence of the ovary, which develops corpora lutea under the influence of testosterone, is necessary for the production of certain of its effects (McKeown and Zuckerman 53). This data together with the facts related in the previous section regarding the presence of androgens in the urine of women shows that the sex hormones are not completely sex-specific either in their effects or in their origin.

Korenchevsky and Hall (54) have carried out an extensive study on the "bisexual" properties of the naturally occurring sex hormones as well as of synthetic derivatives. Korenchevsky (55) cautions against unconsidered clinical use of certain of these compounds because of undesirable effects resulting from their "bisexual" nature.

THE MAMMARY GLAND

Astwood, Geschickter and Rausch (52) have studied in detail the normal development of the mammary gland in rats from birth to maturity. During the first six weeks after birth the development of the glands is independent of gonadal influences. After sexual maturity the female breast undergoes secretory changes with the estrus cycle, and only during pregnancy develops lobules of acinar tissue. The normal adult male gland is made up of clumps of thick-walled acinar-like structures. Estrone injections produce an extension of the duct tree, and in large doses produce secretory changes with cyst formation in both sexes. Progesterone has no apparent action. Gonadotropic hormone in both sexes hastens the formation of the normal adult gland, and in excessive doses produces cyst formation. Testosterone hastens the development of the normal adult male gland, and in excessive doses produces fibrous changes with cyst formation.

In this connection Jung and Shafston (56) have observed a normal enlargement of the subareolar node of the breast in pubescent boys. This enlargement may occasionally be so extensive as to suggest the presence of a pathological condition, but it is only temporary and deserves no surgical treatment. This growth of the subareolar node is associated with an increase in the testicular diameter and suggests that the increased activity of the testis with elaboration of testosterone is responsible for the breast changes. The above work on the rat supports this interpretation.

The phenomenon of "witches' milk" has for years been suspected to be a result of maternal endocrine influences operating on the breast of

apparently settled it. By means of colchicine, a drug which arrests cells in mitosis and thereby allows dividing cells to accumulate in numbers so as to be easily observed, they were able to show mitoses in the germinal epithelium of the adult mouse ovary, which proved that new germ cells continue to be formed in the ovary even in adulthood. This is directly contrary to earlier teaching.

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amounts of histamine are present in the circulating blood during traumatic shock

In arsenobenzene allergy produced experimentally in guinea pigs, Simon and Stoub (77) were able to detect increased amounts of histamine in the blood. Reisser (78) also found increased quantities of histamine in tissues during production of the Arthus phenomenon in rabbits.

However, in patients with pulmonary tuberculosis and asthma, the blood histamine level was normal, although the sputum, particularly if suppurative, contained significant amounts. Marcou (67) has determined the blood histamine under various conditions and has found greatly increased amounts in myeloid leucemia, and decreased amounts in parturient women.

VITAMINS

Although it has been known for many years that Vitamin B deficiency and, more recently, Vitamin A deficiency produce histologically detectable lesions in nervous tissue, there has been some disagreement as to the character and location of such changes. Lee and Sure (79) attribute the disagreement to the use of techniques now known to be capricious and productive of artefacts. They have reinvestigated the problem and employ a rapid freezing technique combined with observations with polarized light, methods which are more reliable. In rats subsisting on a diet deficient in Vitamin B₁, these authors found myelin degeneration and broken axis cylinders in peripheral nerves. Animals deficient in Vitamin A or B complex showed only the myelin degeneration. The central nervous system was normal except for slight degeneration which was found in the spinal cord.

Epithelial metaplasia is frequently found in pathological material, associated generally with irritation in such regions as the respiratory, biliary, and urinary passages, and also in genital epithelium. Metaplasia may be produced experimentally by Vitamin A deficiency, and by overdosage with estrone, but the interrelation and relative importance of these factors have been little understood. McCullough and Dalldorf (80) have made a recent study of these factors in rats. They used as criteria of genuine metaplasia the appearance of true keratinization, the formation of flat, non-nucleated surface cells, and the presence of keratohyaline granules and intercellular bridges. Their results indicate that Vitamin A deficiency is the primary, essential condition for metaplasia, and that estrone and mechanical irritations act solely as secondary factors. It is interesting that they commonly observed metaplasia in the thyroid in Vitamin A deficiency, but only in association with epithelial hyperplasia. The authors believe that active epithelial growth, whether due to estrone, to mechanical irritation, or to spontaneous hyperplasia, will take the metaplastic form if Vitamin A deficiency is present.

Two studies have recently appeared on the toxicity of vitamin preparations. Perla (81) administered massive doses of brewer's yeast, Vitamin B adsorbate, and synthetic Vitamin B, to rats and found the only resulting abnormality was some interference with lactation and nursing instincts. Concerning the alleged toxicity of cod-liver oil, Burack and Zimmerman (82) report that the slight difference in growth rate of rats fed on diets containing from 18 to 27 per cent cod-liver oil or peanut oil was attributable to the difference in the caloric values of the two diets. Pathological lesions occurred so rarely as to be insignificant. In both studies the vitamin dosages were enormously greater than therapeutic dosages.

Growth of our knowledge of the clinical aspects of the vitamin-deficiency diseases has been hampered because diagnosis has had to depend on the recognition of comparatively severe, and only typical symptoms of deficiency. It would be of immense importance if a deficiency could be detected by an analysis of the vitamin content of the body fluids before clinically recognizable symptoms had developed. Although not completely satisfactory as yet, methods have been devised for estimating by chemical means the Vitamin A (83) and C (84) content of the blood. (For a discussion of these methods, see Eddy and Dalldorf's recent excellent book on the avitaminoses, 84.) Recently two methods have been published for determining the Vitamin B content of the blood. Meiklejohn's method (85) is based on a biological assay of the growth-promoting effect of the vitamins on cultures of phycomyces. Pyke's method (86) is based on the conversion of B to thiochrome, which can then be measured in extremely small amounts by its fluorescence. This procedure is applicable to foodstuffs, tissues, and urine, but has not yet been applied to blood. Warkany (87) determines the Vitamin D content of blood serum by the line test in rats deficient in Vitamin D.

The fact that *the presence of bile in the intestine is essential for the proper absorption of the fat-soluble Vitamin A* (88) and D (89) was demon-

the newborn Lyons (57) has detected the presence of mamotropin or prolactin in the urine of such infants, in quantities proportional to the activity manifested by the breasts. This secretory activity is very probably the result of stimulation by estrone and mamotropin derived from the mother.

LACTATION

In discussing the process of lactation one must again bear in mind that important species differences exist. Nevertheless it is generally accepted that proliferation of the female gland elements in adulthood and during pregnancy is accomplished by the action of estrone and progesterone. However, the secretory activity of the mammary glands is probably inhibited by these estrogens, the disappearance of which at the time of delivery precedes and permits lactation. The main stimulus to secretion at this time originates in the anterior lobe of the hypophysis as the lactogenic hormone (mamotropin, prolactin). Other less completely understood influences including nervous reflexes also play a rôle. (For a recent review of the endocrine control of the mammary gland see Nelson, 58). Recent evidence shows that other endocrine factors are also involved in the process of lactation.

Nelson (59) has demonstrated the importance of the adrenal cortex. Lactation is disturbed in

adrenalectomized animals but extracts of the adrenal cortex are able to restore the process. In hypophysectomized animals lactation is abolished. In this case substitution therapy requires the lactogenic hormone as well as either cortical extracts or adrenotropic hormone. Nelson and Tobin (60) have now shown that the thyroid gland is not involved in lactation because the process continues in thyroidectomized animals and because thyroxin with lactogenic hormone is unable to restore secretion in the hypophysectomized animal.

The fact that the estrogenic hormones are necessary, not only to build up the glands morphologically, but also to maintain them in order to permit secretion in response to lactogenic hormone (from the anterior lobe of the hypophysis) has been shown by Grant (61). The regressing mammary gland of the guinea pig fails to respond to prolactin, unless estradiol (dihydrotheelin) and progesterone are also given.

Connon (62) has confirmed previous reports that hormone similar to that of the anterior lobe of the pituitary gland (Antuitrin S) inhibits lactation in albino rats if given in sufficient dosage early enough after delivery. The mechanism of this is obscure, neither estrone nor progesterone seems to be involved as the effect can be obtained in castrated animals (De Jongh 63).

HISTAMINE IN THE BLOOD

Within recent years many reports have appeared concerning the presence and significance of histamine in the blood stream under normal and abnormal conditions. Dragstedt and his co-workers (64) in a series of papers have proved that histamine is liberated from the tissues in anaphylactic shock in the dog and that the vascular reaction and death are completely attributable to the effects of this substance. More recently Dragstedt and Mead (65) have shown that the same phenomenon is responsible for the so called peptone shock produced by a first intravenous injection of peptone. The histamine circulating in the blood under these conditions was demonstrated by its depressor effect on the cat and shown to resemble histamine in all its properties, both chemical and biological.

Barsoum and Gaddum (66) have developed a method for determining histamine in normal blood, the histamine being partially isolated and then assayed biologically. By this method they detected small amounts of histamine in the blood of various animals under normal conditions. All investigators in this field agree that the histamine

is contained in the formed elements of the blood so that its activity is slight but there is no agreement as to which cells are responsible. Some maintain that the greater portion is contained in the red blood cell (67-69) others maintain that it is present in the blood platelets (68) or in the eosinophils (70). The last finding is of interest in view of the fact that allergic conditions are commonly accompanied by an eosinophilia.

Anrep and Barsoum (71) have reported that restriction of the circulation or increased muscular activity in the dog results in an increase in the histamine concentration of the blood draining the area. Feldberg and collaborators have demonstrated the liberation of histamine from the perfused guinea pig lung whenever the lung tissues are injured by peptone (72), staphylococcus toxin (73) and snake venom (74). This work would suggest that histamine might be liberated from injured tissues in traumatic shock but Vinard (68) found only a slight increase in blood histamine under these conditions and the work of Dragstedt and Mead (75) and Schneider (76) demonstrates conclusively that no significant

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strated several years ago by Greaves and Schmidt. These authors have recently extended the work to include Vitamin E, the anti sterility vitamin, among those requiring bile for absorption (90). They also observed that their rats with bile fistulas exhibited a loss of blood coagulability accompanied by a decrease in the prothrombin level of the blood, a condition which was relieved by the administration of large doses of Vitamin K, the anti hemorrhagic vitamin, or by bile salts alone if the diet contained adequate quantities of the vitamin (91). This suggests that this factor also is transported across the intestinal mucosa by bile. The same loss of blood coagulability appeared in rats jaundiced by obstruction of the bile ducts.

The last statement recalls the work of Mc Nealy, Shapiro and Melnick (92) who were able to control the bleeding tendency, which is easily detected by the Ivy bleeding time, in jaundiced patients by the administration of viosterol. This treatment was based on the fact that Vitamin D is apparently involved in hemostasis, and on the evidence that a deficiency existed in these patients because of inadequate vitamin absorption resulting from a decrease or absence of bile in their intestines. The value of viosterol both in hemostasis and prognosis and the dependability of the Ivy bleeding time in detecting the hemorrhagic diathesis in jaundice have been completely confirmed recently (93). On the basis of Greaves and Schmidt's work, Vitamin K may also be of value in these cases.

Vitamin K (*Coagulations vitamin*) is a fat soluble factor, a deficiency of which in chicks produces anemia and subcutaneous intramuscular and abdominal hemorrhages apparently due to reduced blood prothrombin. Similar symptoms have been produced in ducks and geese (94). The above quoted work of Schmidt and Greaves (91) indicates that rats also require the factor. Although its chemical constitution is not known as yet it has been obtained in a crystalline form by Almquist (95). It has been found in hog liver fat, leafy vegetables and to a lesser extent in many cereals. It has been reported that the severe anemia accompanying Vitamin K deficiency in chicks can be cured within three days by minute amounts of the factor (96).

There is rather satisfactory evidence that Vitamin C contributes to the body's defense against infectious diseases. In tuberculosis the effect may possibly occur because of the necessity of the vitamin for the production of intercellular substances in scar formation. Cevitamic acid seems also to protect against diphtheria toxin (See

discussion in Eddy and Dalldorf 84). Attempts to demonstrate the effects of Vitamin C on the opsonic index, complement titer and bactericidal index have yielded conflicting results. However, Madison and Manwaring (97) have confirmed a previous report (26) that the administration of large doses of cevitic acid increases antibody production. These authors found that if sodium ascorbate was injected simultaneously with horse serum into rabbits the precipitin titer of the blood was greatly augmented over that of the controls, and persisted at high levels for a much longer period. This suggests that the vitamin may be involved in specific resistance to disease as well as in "constitutional" resistance.

One must keep the vitamins as well as the calories and the physiology of the basic food stuffs, in mind in the treatment of disease but not become a food faddist or enthusiast. One should bear in mind the possibility of a 'subclinical vitamin deficiency' whenever there is (1) a gastrointestinal disturbance, (2) an increase in the basal metabolic rate, and (3) an increase in the growth and reparative processes going on in the body. The vitamins are as essential to build, maintain, and repair protoplasm as minerals and other foods.

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SURGERY OF THE HEAD AND NECK

THE VALUE OF IRRADIATION IN TOXIC GOITER

Collective Review

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KNOWLEDGE of a relationship between the thyroid gland and a characteristic symptomatology with altered bodily metabolism is of long standing, but the exact etiological relationship of the thyroid to toxic goiter is not settled. The cause of the latter condition is unknown, but Boyd suggests that the cause may not originate within the thyroid. The latter writer mentions that the thyroid changes probably are compensatory in nature, a response to a primary metabolic disorder elsewhere in the body. Boyd reduces all of the changed anatomical appearances of the thyroid to terms of diffuse or localized hyperplasia and involution, the former being a compensatory process when the deficiency has been corrected. Both phenomena may be present simultaneously in the thyroid, but a pre-dominance of one over the other influences the clinical picture. Whatever the exact cause of toxic goiter may be, the symptoms are related to overactivity of the thyroid, and it is from this phenomenon that the patient needs to be protected.

It would seem more in keeping with physiological principles to employ a therapeutic agent with inhibitory influence on cellular activity of the thyroid. Thus radiation for inhibition of the thyroid, or for destruction of portions of it, would appear more ideal than removal of all or most of the gland.

Beck, F. H. Williams, and Pusey were among the earliest to report the use of roentgen rays in the treatment of goiter. This was about 1900. Pfahler also made early contributions. In 1916 Pfahler and Zulch concluded: (1) all cases of hyperthyroidism should be given at least one roentgen treatment, and one month should elapse before operation; (2) treatment should be directed toward the thymus as well as toward the thyroid; (3) an increase in weight and a decrease in pulse are the first signs of improvement; (4) treatments should not be prolonged over too long a period; and (5) the goiter and the exophthalmos

are list to show improvement and many times show no change.

In 1923 Holmes (2) stated: 'The truth in regard to the best treatment for exophthalmic goiter probably lies somewhere between the views of the enthusiastic surgeon and the enthusiastic radiologist.' Two-thirds of all of Holmes's patients with toxic goiter were either cured or benefited. The condition in the remaining third was unchanged. He recommended correlation of roentgen and other forms of therapy.

In 1925 we were able to conclude on the basis of 400 cases observed that 80 per cent of exophthalmic goiters will respond to radiation therapy. The importance of individualizing each case was emphasized, and also the need for metabolic determinations correlated with clinical evaluation of the patient as a control for the management of radiation therapy was brought out.

Pfahler and Vastine (5) in 1930 reported on observations made while treating 400 cases of goiter. Of this number 235 were classified as the exophthalmic variety. Fifty-eight per cent of the patients were cured for an average of six years, a cure being manifest by absence of toxic symptoms, visible thyroid enlargement, recognizable residual myocardial change, and diminution of the exophthalmos. Twenty-eight per cent of the 235 patients were markedly benefited and able to resume their occupations but with some restriction of activity. The authors found the percentage of cures no higher in the mild than in the more severe cases. They observed that the sooner after onset of the condition treatment was instituted, the better the response. Eight per cent of the patients were operated upon subsequently. Nineteen, or 8 per cent, presented postoperative recurrences. Of these 19, 9 per cent were either cured or markedly benefited. Of the sequelae encountered, telangiectasis and hypothyroidism of mild degree were considered as probably being due to more radiation than is now employed. Telangiectasis occurred in 4 per cent of the patients, all of which were among the earliest treated. Four patients developed hypothy-

roidism, but only 2 of these manifested clinical symptoms which required thyroid medication. Nineteen patients died, the death in most instances being due to causes unrelated to the thyroid condition, or due to the markedly advanced state of the toxicosis. In comparing the drop in the metabolic rate obtained surgically in 100 cases at the Lahey Clinic with the drop obtained as a result of irradiation, Pfahler observes that a large factor in the metabolic drop noted in the surgically treated cases may be attributed to the medical measures, particularly rest, which were instituted before surgery was started. The patients treated by irradiation were ambulatory, often pursuing their usual activities.

Pfahler treated 92 patients with toxic adenoma and obtained either cure or marked improvement of the condition in 91 per cent. He found that the enlargement in exophthalmic goiter most often disappeared completely following irradiation, but it usually was the last symptom to disappear. Adenomatous goiter was reduced in size but did not disappear completely.

From the standpoint of technique, Pfahler divided the anterior cervical region into four areas, two anterior and two lateral, each area approximately 5 by 15 cm in size. The anterior areas extended well down over the upper mediastinum. The upper limit was taken 2 or 3 cm below the cricoid cartilage and the larynx was protected with lead. The direction of the rays was downward and medially in such a way that cross-firing was produced. In adenoma, localized doses are recommended with cross-firing of the adenoma through two portals. In the milder toxic cases an initial dose, 50 per cent of the skin-erythema dose, was given through each of the four portals. This should be repeated, according to Pfahler, in three weeks, with less irradiation, i.e., with from 40 to 50 per cent of an erythema dose. After this, the interval may be prolonged from four to eight weeks with gradual reduction in the amount of irradiation. The subsequent course is determined by the response to irradiation. Pfahler stated that it is probably wiser to give initial doses of from 30 to 40 per cent of the skin-erythema dose in the more severe cases, and gradually increase to 50 per cent. Pfahler also stated that he expected almost complete relief after six series, and that ten series was the maximum in any case. Three or four series of radiation treatments and a lapse of from two to three months without improvement requires the use of other measures. Pfahler included in his report a summary of 3,300 cases treated by other radiologists with cure or marked improve-

ment in the condition in an average of from 85 to 90 per cent of the cases.

In a later report (4), Pfahler commented that overactive glandular tissue was more sensitive than the normal, and cited the work of Orndorff and Ivy who found that it took about 6 human erythema doses to depress the function of the submaxillary gland in the dog with this dosage, approximately twice the amount of total irradiation given for hyperthyroidism in from six to eight months. He cites further the work of Walter, Anson, and Ivy who stated, "The normal thyroid of the dog is quite resistant to x-rays and degenerative changes are not caused by the dosage used in the experiments, which is a dose known to be of some clinical value," and "in the dosage used do not cause extensive proliferation of connective tissue. The results indicate that the clinical dosage in the treatment of hyperthyroidism will not injure the parathyroids."

In this report, Pfahler's technique was the following: 130 kv peak, 5 ma., 8 min at 30 cm. distance, filtered through a combination filter of copper and aluminum equal to 6 mm of aluminum. This gave 40 per cent of an erythema dose for the equipment used. Two anterior and two posterior fields, each about 5 by 15 cm. to include both the thyroid and the thymus glands, were employed. It was necessary to protect the larynx and the remainder of the body. Pfahler gave the series of four doses in succession in one day, repeating in three weeks and then in four weeks, the interval being increased in accordance with the response. Therapy was discontinued as soon as the basal metabolism reached plus 15 or plus 10.

At this time, Pfahler found on reviewing all of his cases that 87.8 per cent of the patients were either cured or markedly benefited. A cure was based on a normal metabolic rate, normal pulse and weight, absence of all toxic manifestations, and disappearance of the goiter. Improved cases were those in which the metabolism was markedly decreased and most of the toxic phenomena had subsided. The average number of treatments in which a series of 4 fields was given on one day was 6.1 for the cured cases, 5.7 for the improved cases, and 3.7 for the unimproved. The cured patients were kept under observation for an average of 5.2 years and the patients who were benefited for an average of 2.2 years. Pfahler concluded that the results obtained by irradiation were equal to those obtained by surgery with less shock and risk to the patient and without the danger of hypothyroidism and tetany. He stated:

Not surgery nor irradiation nor medication can be depended upon to cure all cases and no one method is so much superior that we can recommend it to the exclusion of the other two. Our records show almost exactly as many cases referred by us to the surgeon as were referred to us after surgery had failed. It is the general opinion of radiologists that all cases which are not seriously involved by mechanical pressure or so acute as to make delay of one month dangerous should be treated by irradiation. Irradiation and every valuable method of medication can certainly be employed to advantage. If there is no definite improvement after two or three months surgery can still be used. The delay which always precedes operation can be used to advantage in this manner. When irradiation fails surgery can still be used when surgery fails irradiation can be used. Medication and the advice of the internist are of value in all cases but there will remain a small number in which we all will fail.

This year, Harris (1) reported the results of seven and a half years' observation of cases of toxic goiter irradiated at the University of Pennsylvania. During the first part of the period, the technique consisted of 135 kv peak, 5 mm aluminum filtration, 4 min., through 4 by 4 inch portals to four different areas over the gland. Approximately 125 roentgens were given in this manner and a series was given at three week intervals. Later during the period under consideration the dosage was increased to 250 roentgens which were given to the gland through one large portal with 135 kv peak (mechanical rectification) 5 ma, and 30 cm distance. The output with these factors was 27 roentgens per min., half value layer 42 mm copper and effective wave length 23\AA . They employed a 12 by 15 cm portal which included the anterior thyroid area and the cervical sympathetics with protection to the larynx. An alternate technique employing higher voltage when low voltage had been ineffective was used occasionally. This technique used 165 kv peak (valve tube rectification) 15 ma, 5 copper plus 1 aluminum filtration and 30 cm distance. These factors produced an output of 40.0 roentgens per min., half value layer 58 mm copper and effective wave length 17\AA . Two hundred roentgens measured in air were given every other day for three days and 600 roentgens constituted a series. A basal metabolism rate was taken in one month and further therapy depended on the results obtained. The importance of accurate calibration in roentgens was emphasized.

This analysis based on 144 cases of toxic goiter led Harris to state that improvement became more apparent with the progress of time. Thus the good results in the first part of the period constituted only 50 per cent of the cases treated while in the last part of the period good results were obtained in 90 per cent of the cases. It was not possible to reach a conclusion on the relation

ship of the results obtained to the number of series of treatments given. Usually two series of radium treatment and ten series of roentgen treatment were given. The radium was used in the form of a large pack to each half of the gland as a series, with 4 mm lead filtration and 3 cm distance. There was no significant relationship between the patient's age and the response. Harris favors treating the following types of cases: (1) postoperative recurrences, (2) those with mild to moderate degrees of hyperthyroidism in which the predominating symptom is nervousness and in which there are no evidences of visceral damage, those associated with little or no loss in weight, and those with slight to moderate thyroid enlargement and in which the goiter is not hard or nodular, (3) those of children with toxic symptoms are treated except those with nodular goiters, (4) those of patients who are poor operative risks and to whom the irradiation is given as a preoperative procedure and (5) those in which the patients refuse surgery.

Prior to 1930 it was not uncommon for us to treat 3 or 4 patients daily for thyroid toxicosis by means of irradiation in the x-ray department of St. Luke's Hospital. Since 1930 there has been a marked decrease in the number of patients referred to the department for treatment. This decrease in the number of patients treated may be due to several factors. First the use of iodine for the preparation of the patient probably made the patient a better surgical risk. Consequently more patients were operated upon. We were under the impression that surgeons in smaller cities who formerly referred their patients to clinics in larger cities now because of the use of iodine and the fact that many were well trained men were doing their own surgery. If this were true we would consequently see fewer patients in our department.

In going over the surgical schedules of many hospitals including our own and inquiring of several large clinics, we found that the number of thyroid glands being operated upon had not increased. On the other hand there had been a decrease.

At a symposium on thyroid disease in which Plummer of The Mayo Clinic took part he made this statement:

Following the 1918 epidemic, there was a marked increase in thyroid toxicosis. The increase continued until about 1927 and then rapidly decreased. Plummer said that this probably explained the decrease in the number of the patients coming to the Roentgen Department for treatment.

Since our previous report, we have treated 154 patients with toxic goiter, 70 per cent of whom showed improvement clinically and in their metabolic rate. The remainder were unchanged. It is the author's practice to use 125 kv peak, 5 ma, 10 min, 16 inch distance, and 6 mm. aluminum filtration (effective wave length 25\AA°), administering 200 roentgens per each treatment on three successive days and thus completing one series. Three portals are used, the anterior to include the thymus area, and right and left lateral areas. In cases that prove refractory, it has been found useful to vary the technique by increasing the voltage to 200 with 5 mm copper and 1 mm aluminum. The effective wave length with these factors is $.15\text{\AA}^\circ$. As mentioned, the necessity of individualizing each case is important, and clinical evaluation of the patient with frequent observations of the metabolic rate is essential.

We prefer to maintain contact with our patients following treatment, whenever possible, in order to evaluate the efficacy of our treatment. Thus, we have records of patients in good health for over twenty years following the initial treatment, and there are also available records of over 300 patients in good health for over four years following their first treatment.

On the basis of our experience, we feel that children should not be treated and that goiters

which produce mechanical destructive effects on neighboring structures and those with probable cystic changes should not be irradiated. Male patients and elderly patients with increased metabolism do not respond well to radiation, the latter probably because the increased metabolism may arise on a cardiovascular basis. Hospitalization preceding, during, and for a few days after the initial series, is a desirable procedure, although it is not imperative. Lugol's solution should be discontinued two weeks preceding irradiation because it confuses the results of irradiation. We find that 220 r is an adequate dosage to any one area in any one series. The value of altering the technique arises from the fact that there may be only an isolated portion of the thyroid gland which requires suppression of its activity. This portion may be uninfluenced by radiation with one technique, but influenced with another, that is, there is adequate absorption in the latter case, but inadequate in the former.

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EYE

Lagrange, II.: The Surgical Treatment of Chronic Glaucomatous Ocular Hypertension. *Brit J Ophthalm*, 1937, 21, 477.

Persons who present ocular hypertension following iritis, traumatism, or tumor may have hard eyes and increased intra-ocular tension, without necessarily being glaucomatous. Ocular hypertension is an essential diagnostic sign in glaucoma, but one that is not exclusively peculiar to glaucoma. The characteristic condition in glaucoma is not hypertension in itself, but the manner in which hypertension occurs. It assumes a particular type in each of the several forms of glaucoma, viz, prodromal glaucoma, chronic glaucoma with intermittent hypertension, chronic glaucoma with constant hypertension, irritable glaucoma, and acute glaucoma.

In prodromal glaucoma hypertension is of low degree. Subjectively, it is indicated by the appearance of a foggy or smoky veiling, or by colored arcs. Objectively, it presents pupillary dilatation and a slight milky turbidity in the cornea.

Chronic glaucoma with intermittent hypertension is defined as optic atrophy with excavation. Hypertension is transitory. Other signs, such as alterations in the visual field, in light sensation, in the pupilla,

and in the amplitude of accommodation, are often those which permit diagnosis.

Chronic glaucoma with constant hypertension is the clinical type which occurs most frequently. In this type with moderate hypertension, violent crises may follow emotional conditions or surgical procedures. This instability is shown inversely by the remarkable efficacy of rest and also by the use of miotics.

In irritable glaucoma the ocular tension undergoes fluctuations which occur still more frequently. It is always evidenced by pupillary dilatation, changes in the corneal transparency, vascular congestion, and a bluish aspect in the episcleral circulation.

Acute glaucoma presents hypertension and, from the onset, the hardness of absolute glaucoma. It is related to Quincke's disease or to urticaria.

Alterations in the visual field in cases of glaucoma consist in nasal and inferior narrowing. This sign is notorious and requires stressing only in order to recall the fact that its constant and early appearance renders it characteristic of true glaucoma. The most common form, the paracentral scotoma of Bjerrum, is typical. The Mariotte spot may become enlarged. Minor signs of glaucoma consist of the Bjerrum paracentral scotoma, loss of the differential

light sense and preservation of the absolute light sense. Medical treatment is sometimes capable of retarding its course, of relieving certain prodromal signs of glaucoma and of rendering grave intermittent exacerbations less frequent. It includes good correction of ametropia, attention to algectic states in the vicinity of the eye, of the oculo-ocular reflexes, regulation of sympathetic imbalance, treatment with calcium chloride or iodides, cardiovascular tonics, correction of hyperglycemia, and anti-syphilitic medication. Pilocarpine is the sole medicinal agent the efficacy and mechanism of which are truly comparable to those of surgical fistulization.

The author asks how is it possible for surgery to be imprudent and inadvisable if the following conditions exist in spite of medical treatment: (1) decline in central visual acuity; (2) failure of the ocular tension to become normal; and (3) progressing alteration in the visual field such as fluctuations in tension, narrowing of the visual field and declining visual acuity?

Surgical treatment though reaching only the hypertensive syndrome, is a measure of prudence and the only palliative one of permanent and durable efficacy for the idea that hypertension in the eyeball presides over all the ocular signs of glaucoma still remains good.

The author states that the value of iridectomy in the treatment of acute glaucoma is unquestionable but that it is very disappointing in chronic glaucoma. The solution of the problem of durable fistulization of the eye and establishment of the principle of action and the site of election were the innovations provided by the Lagrange operation. The following points distinguish this operation from the von Graefe operation:

1. Iridectomy is a classical procedure in acute glaucoma.

2. It is not indispensable in some forms of chronic glaucoma.

3. Iridectomy may be performed by simultaneous section of the scleral crescent between the same jaws of the forceps.

4. In iridectomy care should be taken to grasp the iris without groping for it in the anterior chamber.

5. If iridectomy is not done the only thing risked is a well protected subconjunctival strangulation of the iris or iridocyclitis.

The beneficial effects of the von Graefe iridectomy are never absent in all treatment for combating glaucoma. The von Graefe iridectomy does not appear to be absolutely necessary in chronic glaucoma.

In conclusion the author states that it is necessary to operate without delay in cases of glaucoma in which medical treatment fails to reduce the ocular tension to normal limits and that operation is necessary even if the medical treatment does reduce the tension to normal should alteration of the visual field progress in the slightest degree or should visual acuity decline.

LESLIE L. MCCOY, M.D.

Spaeth, E. B. The Use of Mucous Membrane in Ophthalmic Surgery. *Am J Ophth* 1937 20 597

Mucous membrane grafts which should always be taken from the buccal mucosa of the mouth have a very definite place in ophthalmic surgery. The indication for their use is a conjunctival defect in the presence of an intact and healthy eyeball. The conjunctiva of the eyeball and of the upper lid should never be replaced with skin, as the superficial layers of the skin pile up on the surface of the graft and produce conjunctivitis and keratitis.

In the technique of mucous membrane grafts the intact conjunctiva is first incised and undermined the cicatricial tissue then being resected. The defect produced is then matched with a model cut from oiled silk. Allowing but little for shrinkage of the graft, the surgeon places the pattern on the buccal mucosa, avoiding the duct from the parotid gland and accurately cuts the graft. The incision line is sutured with fine dermal suture after hemostasis. The posterior surface of the graft is carefully trimmed down to the mucous membrane layer and then inserted into position in accordance with the particular case involved. In the correction of defects of the inferior cul-de-sac sutures are not necessary except for a temporary intermarginal suture to keep the lids closed but a pressure bandage should be employed.

The author believes that mucous membrane has its greatest advantage in the correction of trachoma and entropion especially when caused by trachoma. In this condition he uses a slight modification of Van Milligen's original method. Reformation of the upper lid may be carried out according to the technique of Axenfeld. Lesser defects of the lids may be corrected by use of a pedicle flap with the prior formation of a pocket lined with mucous membrane in such a position that it can later be used to fill in the defect. Mucous membrane grafting is also recommended for pemphigus of the conjunctiva especially in early cases and in cases of complete destruction of both the upper and lower cul-de-sac from acids or caustics.

WILLIAM A. MANN, JR., M.D.

NOSE AND SINUSES

Looper, E. A. Infection of the Nasal Accessory Sinuses in Children. *Med Clin North Am*, 1937 21 1523

Frequent colds associated with nasal discharge generally mean infection of some of the accessory sinuses. Such infections retard the development of the sinuses themselves so that a condition is left for the continuance of a chronic disease which might have been prevented if early treatment had been instituted. In all cases of children with inflammatory lesions around the nose and throat in which there is a great deal of sneezing, congestion of the turbinates and constant colds with thick profuse nasal discharge a careful investigation of the sinuses is recommended.

The maxillary antra and ethmoid cells are present at birth, while the frontal and sphenoid sinuses make their appearance before the third year. Therefore, from an anatomical standpoint, the sinuses in early life are sufficiently developed to be taken into consideration in pathological processes.

X-ray examination is of the greatest aid in the diagnosis of infected sinuses, but the plate must be made by a skillful roentgenologist and the interpretation must be correlated with the clinical findings.

Orbital abscess is one of the most frequent complications, and often the most dangerous complication of accessory sinus disease. Meningitis and brain abscess are very serious and usually result fatally. Anemia, loss of weight, unexplained low temperature, and gastro-intestinal symptoms are frequently present, so that any such group of symptoms calls for investigation and treatment of the sinuses.

The proper treatment of infected sinuses of children improves their general health, they take on weight, develop more rapidly, and give every appearance of being greatly benefited. Most of the patients can be cured by local treatment, for only a small number require operative procedures. If the tonsils and adenoids have not been removed it is advisable to get them out in order to clear up as many foci of infection as possible.

CHARLES BARON, M.D.

MOUTH

Ritchie, W. P.: Cleft Palate: A Correlation of Anatomical and Functional Results Following Operation. *Arch Surg*, 1937, 35 548

The author reviews the literature and gives a complete summation of all reports of correlated palate repair and speech result. A detailed method of speech study is presented.

The cases of 100 patients who had previously been operated upon for cleft palate, some of whom also had harelip, were carefully studied, both as to anatomy of the corrected palate and as to the correlation of the anatomical result with speech. The findings were as follows:

Good anatomical results do not necessarily mean good functional results.

Imperfect closure of the velopharyngeal sphincter is by far the most important anatomical element in ultimate speech results.

Velopharyngeal insufficiency is the most important factor in the omission, substitution, and disarticulation of most of the consonants. The slurring of *s* and *ch* is an exception.

Velopharyngeal insufficiency is the cause of nasalization and, therefore, the disturbed quality of cleft palate speech. There is a possibility that scar tissue and taut mucous membrane play a rôle in the poor quality of speech by disturbing the vibratory capacity of the cavities of the upper respiratory passage.

Abnormal contour of the teeth causes slurring of *s* and *ch*.

Holes just posterior to the alveolar process in the anterior part of the hard palate have a tendency to cause omission of the labiodental consonants.

Small holes in the hard palate cause no phonetic defect.

Large holes in the middle portion of the hard palate tend to cause a "hot food" quality of speech rather than a disturbance of articulation.

Holes in the lateral part of the hard palate also tend to cause a "hot food" quality of speech.

Holes in the soft palate tend to cause omission of the posterior linguopalatal consonants.

The motility of a palate appears to be more important than length, as regards closure of the velopharyngeal sphincter.

The superior constrictor muscle elements are important in closure of the velopharyngeal sphincter and are usually hypertrophied.

The uvula may be of importance in closure of the velopharyngeal sphincter, but the analysis does not indicate this.

A person with a cleft palate usually has distorted nasal cavities and, occasionally, the inferior turbinate bones are enormously dilated.

Adenoidectomy and tonsillectomy are indicated if the motility and length of a palate are good.

Speech education is of the greatest value in correcting articulation.

No amount of education will entirely overcome marked velopharyngeal insufficiency, although it is of definite value in lesser degrees of insufficiency.

LOUIS T. BARS, M.D.

NECK

Wijnbladh, H.: Thyrotoxic Crises and Their Treatment, With Special Consideration of Iodine Therapy (Ueber die thyreotischen Krisen und ihre Behandlung, mit besonderer Berücksichtigung der Jodbehandlung). *Acta chirurg Scand*, 1937, 79 507

The disease picture of thyrotoxicosis may vary so considerably that the symptoms are sometimes defined with difficulty or are even paradoxical, as thyroid enlargement may be absent, with a normal pulse frequency, or a normal basal metabolism. The motor system may vary from complete muscular incoordination up to difficult motion due to apathic toxæmia and catalepsy and parkinsonism. The gastro-intestinal symptoms may be diarrhea or constipation. The clinical course shows all transitions from the slightest to the most severe forms, from "galloping" to chronic forms which gradually disappear. During the course of thyrotoxicosis first one, then the other organic system may be involved. "Basedow coma" is one of the severest complications. The term "crisis" refers to conditions which directly threaten life.

The different types of operations on the thyroid are the most frequent causes of the crisis. These may produce the "typical Basedow death" or post-operative reaction. Similar crises may also result

from operations on distant organs and even minor surgical interventions roentgen therapy, massive thyroid medication and sudden interruption of a pre-operative iodine therapy infections diagnostic procedures such as the determination of the basal metabolism bodily exertion and severe emotional strains. A severe thyrotoxicosis may also lead spontaneously to a crisis.

Since the introduction of pre-operative iodine therapy the danger of postoperative crises is rare. The true non postoperative crises are rare in Oslo because these cases are treated by surgeons promptly and adequately. They are more common and more severe in males than in females.

The symptoms of the fatal postoperative crisis are characteristic and too well known to require description. Those of the other the non postoperative form vary similarly as the different clinical forms of thyrotoxicosis. A threatening sign is every aggravation of the patient's condition especially insomnia anorexia and vomiting. Aggravation of existing symptoms is characteristic. The symptoms of one and then the other organic systems predominate such as the gastro intestinal and cerebral systems. The course may be fatal after one or a few days or the symptoms may recede after the exciting factor such as infection subsides or etiological therapy is instituted. Five such cases are reported.

Both the postoperative and the other crises are best prevented by the modern pre operative iodine therapy. Most of the fatalities from non postoperative crises may be avoided by early surgical treatment of the thyrotoxicosis. These patients should be treated in suitable hospitals as they are extremely influenced by their surroundings. A sudden removal from their surroundings to a surgical division is a considerable trauma. The patient's confidence should be gained by the surgeon. Basal metabolism tests should not be made when the symptoms become aggravated. The taking of the skin temperature (Ipsen) is a valuable substitute. Slight interventions such as mouth sanitation should be done only after serious consideration of their possible effect. If an acute urgent operation such as appendectomy is necessary the thyrotoxicosis should be treated simultaneously. The author believes that non surgical iodine therapy especially with large doses and in severe cases is dangerous in the ultimate surgical treatment. This should serve as a warning that iodine therapy in all thyrotoxicoses in which surgery is contemplated should be done only with consent of the surgeon or entirely under his control. In thyrotoxicoses iodine should be given only pre operatively or in cases in which surgery is not likely to be employed. The iodine therapy of Plummer on the other hand is one of the best positive remedies for preventing crises.

The treatment of imminent or beginning crises includes strengthening of the usual measures against thyrotoxicosis also isolation against all external disturbances a diet rich in calories and especially

Vitamins A and C abundant sedatives and narcotics such as 0.9 gm. of luminal per day or diazepam substitute, and morphine and the like and in very rebellious cases eukodal scopolamine also given pre operatively. The abundant administration of fluid and glucose b, mouth, rectum and by injection is most important. Sodium chloride may be added to the glucose solution. The glucose solution should be given in large doses of 500 gm. or more in 5 liters daily by continuous intravenous drop infusion. Cardiac and vascular remedies such as digitalis strophanthin quinidine and camphor preparations have a limited value during a crisis and should be reserved for special cases such as severe cardiomyoses. Bloodletting followed by blood transfusions are helpful. Ice packs and oxygen tent therapy are advantageous. Kendall's adrenal cortex extract as well as sodium citrate and physiological salt solution have been employed at the Mayo Clinic.

The pre-operative iodine therapy is one of the most certain protective remedies against both the pre operative and postoperative crises. The usual dosage is from 30 to 60 mg. or from 5 to 10 drops of Lugol's solution two or three times daily usually increased gradually to from 90 to 125 mg. or from 15 to 20 drops of Lugol's solution three times daily for from eight to twenty-one days. A double or even greater dosage on the day of operation and thereafter has a certain value. The dosage should be individualized. When the pulse and temperature rise when the struma increases in vascularity and when the patient looks and feels worse the iodine is increased. Iodine is most necessary in imminent or existing crises especially postoperatively. Iodine should be given in very large doses and increased if necessary until the patient's reaction improves. Then the dosage is decreased.

LOUIS NEWELL MD

Gluffrida E. Laryngeal Stenosis in Undulant Fever (Stenosis laryngeae da brucellosi melitense) *Misera med.* 1937 43 97

Gluffrida believes that the 3 cases here presented are together with Gritti's case reported in 1934 the only reports of laryngeal stenosis occurring during the course of a previously diagnosed undulant fever. Two cases of necrotic pharyngitis with bronchopneumonia were reported by Frugoni in 1930 and by Malan in 1931.

After five months of fever the first patient a man forty two years old developed a perichondritis involving the epiglottis and arytenoids with extensive ulceration and necrosis. Cultures showed a mixed flora. Death occurred from sepsis.

The second patient a youth of twenty years had apparently recovered from a severe attack of undulant fever but a month later a hyperplastic perichondritis involving particularly the arytenoids occurred. Tracheotomy saved the patient's life but a cicatricial stenosis developed and the latter is still under treatment.

In the third case also, the fever had been absent for five months, when it reappeared, accompanied by laryngeal edema. Examination showed ankylosis of the left crico-arytenoid articulation and fixation of the cord, which produced noteworthy stenosis. Death was due to lung abscess.

In the fatal cases intravenous vaccine therapy had never been carried out consistently, and in the surviving case it was begun late. Early and adequate intravenous administration of vaccine is, in the author's opinion, the best prophylaxis against laryngeal complications. Furthermore, the possibility of an undiagnosed brucella infection must be considered in laryngeal stenosis of uncertain cause.

The pathology of laryngeal stenosis in undulant fever is fundamentally the same as in other infectious diseases. The lesions may involve the mucosa or skeleton, or both, and may be complicated by ulceration, necrosis, and eventually sepsis, or hyperplasia of the mucosa may result in cicatricial stenosis. A difficult question to answer is whether the laryngeal lesion represents an independent localization of the brucella or is due to secondary organisms. None of these patients had had laryngeal symptoms previous to the undulant fever, but during its course they presented certain suggestive manifestations. In the first patient, the infection began with sore throat and high fever. Several months before the laryngeal symptoms appeared, the two other patients had aphthous stomatitis and pharyngitis,

which yielded to treatment. These facts are probably significant in view of the rarity of involvement of the upper respiratory and alimentary tracts in undulant fever.

The occurrence of laryngeal stenosis must be regarded as an indication of particular gravity of the disease, entirely separate from the local lesion, and it always carries a dubious prognosis. Even though tracheotomy may overcome the immediate danger, its ultimate success is usually frustrated by other factors.

M. E. MORSE, M. D.

Martin, C. L.: Malignant Tumors of the Throat
Surgery, 1937, 2: 381

The author reports 17 cases of malignant tumor of the throat, and presents evidence to show that irradiation therapy is the method of choice in all malignant tumors of the pharynx and larynx. He employs a modified Coutard's technique. A complete regression of the primary tumor was obtained in all of the 17 cases of pharyngeal carcinoma, and marked improvement appeared in the neighboring extensions, even in advanced stages of the disease. Death, when it occurred, resulted from complications or distant metastases. The immediate improvement in the patient's condition was very striking in every instance. The author's experience had not at this time extended over a period of five years. He concludes that irradiation should replace surgery in all borderline and inoperable cases.

JOSEPH K. NARAT, M. D.

SURGERY OF THE NERVOUS SYSTEM

TRIGEMINAL NEURALGIA

Collective Review

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A REVIEW of the recent developments in our knowledge of trigeminal neuralgia would not be complete without some mention of those individuals who first directed the attention of the medical world to the condition and who have made major contributions to our understanding of it. The names of Avicenna, Schlichting Andre, Fothergill Carochan, Rose Horsley, Hartley Krause, Pitres and Verger, Levy and Baudouin, Spiller, Frazer, Patrick, and Cushing stand as guideposts along the trail that medicine has followed in its search for complete understanding of the condition. The fact that this goal has not yet been reached is adequately shown by the large number of articles on various phases of the subject which have appeared in medical publications in the past six or seven years.

For the purposes of this review, a rather complete bibliography of all publications on the subject from 1930 through the first half of 1937 has been assembled and is appended for the convenience of those desiring more detailed information than a compendium of this nature permits. Many of these articles have thorough historical reviews in their introductions (5, 57, 66, 130, 156, 166, 223, 339). The reader is referred through them to the more ancient sources.

Because most of the articles are not limited to a discussion of any one phase of trigeminal neuralgia, it is a practical impossibility to segregate the various works into appropriate divisions so far as the etiology, pathology, diagnosis, differential diagnosis, and treatment of the condition are concerned. However, the author will for the sake of clarity in the review consider the works on trigeminal neuralgia under those headings with it is hoped, sufficient reference to the bibliography to guide one desiring to make a more complete study of the subject. It is obvious also that space does not permit detailed mention of every publication on the subject in a review of this nature. It has been the aim to bring out the more important developments in so far as possible in such a

way that the majority may have in brief a thorough insight into the progress made in this one field in the past few years.

ETIOLOGY AND PATHOGENESIS

Careful perusal of the literature serves only to emphasize the fact that the exact nature of trigeminal neuralgia continues to elude us. Many hypotheses have been promulgated frequently with good evidence to support them. As yet no absolute proofs are at hand. Numerous theories are quite contradictory.

Many isolated cases are reported as being due to specific conditions such as dental granulomas (97), sensitive fillings (247), infected tonsils (276), tumors of the pituitary gland (39), chronic sinusitis (95, 228), diabetes (16, 250), syphilis (93), and faulty calcium metabolism (215). It may here be stated that some authors (10, 15, 54) are careful to distinguish between 'typical' or 'true' trigeminal neuralgia and other types of facial pain which may closely simulate it. Strict adherence to the concepts of some as to what constitutes true trigeminal neuralgia would seem to vitiate some of the aforementioned causes. However, the descriptions of the condition given in most of the cases are truly typical.

While it is infrequently seen before the age of thirty years, some cases are reported as occurring as early as the age of ten or twelve years (60, 200, 248, 3, 5). Heredity or familial tendency is mentioned as a possible factor (35, 326). Harris (326) stated that in his experience inheritance as a factor is not very rare and when it is a factor the condition invariably appears at an earlier age in the second generation and at a still earlier age in the third. The incidence of trigeminal neuralgia in women has been considered to be much higher than in the opposite sex (Caldwell, 200). Jefferson (62) does not think the sexual disparity marked enough to lead in itself to any special deductions.

The appearance of trigeminal neuralgia in cases of multiple sclerosis has been noted by many observers (131, 180, 282, 326). Meredith and Horrax (282) found 25 cases of concomitant in

geminal neuralgia and multiple sclerosis in a seventeen-year review of the literature and added 2 cases of their own. With a careful analysis of these cases they were unable to account for the origin of the facial pain in multiple sclerosis. They called attention to the fact that while paresthesias and numbness are common in multiple sclerosis, pain or neuralgia of any type is rare. They believed it unlikely that plaques in the root or medullary course of the trigeminus could account for the origin of the pain in cases of multiple sclerosis.

Dandy (203), in a search for possible causes of trigeminal neuralgia, noted that in 7 per cent of the cases there was a definite relation of a gross lesion to the production of pain. If he included arterial and congenital anomalies about the root and cases of multiple sclerosis, the percentage was raised to 42 per cent. Aberrant venous branches raised the total to 56 per cent, and if he included cases showing adherent nerve roots the percentage was raised to 60 per cent, which leaves only 40 per cent without evidence of gross lesion to account for the pain production. For this latter group he considered the possibility of some intrinsic disturbance of the sensory root, as he believes that whatever the cause of trigeminal neuralgia it must be located in the sensory root.

Alajouanine and Thurel (139) subscribe to a theory embracing a more central origin of the pain. The fact that the trigger zone and the painful area are sometimes dissociated, the fact that the pattern of irradiation of the pain does not always correspond to the course of the nerve trunks, and the fact that there is a variability of action of the provocative cause from one moment to another, they argue, point to a nuclear cause for the syndrome. The authors mentioned the cases of trigeminal neuralgia in multiple sclerosis and syringobulbia as examples. They were able to account for the relief of the pain by neurotomy or alcohol injection only if it was admitted that the pain depended upon a dolorogenic zone. However, they state it is not understandable how a pain of nuclear origin can disappear after the peripheral destruction of the nerve.

A number of observers would locate the site of origin of trigeminal neuralgia in the gasserian ganglion. McKechnie (170) thought his case demonstrated that the neuralgia may be caused by some abnormal vasomotor influence in the ganglion. Grant (205) reported comparative studies of ganglia and nerve trunks from 2 patients with trigeminal neuralgia dying from apoplexy. No difference between the nerves and ganglia from the affected and the non-affected

side could be discovered on most searching examination.

Harris (326) believes that the evidence points to a more peripheral origin for the condition. It is his view that trigeminal neuralgia is most probably due to some pathological changes in or about the nerve endings.

The functional nervous elements present in many cases of trigeminal neuralgia are considered at length by Ball (1). In his opinion trigeminal neuralgia belongs in the category of functional nervous conditions. He expresses the belief that the condition presupposes a neuropathic disposition and that in these cases the distribution of the fifth nerve is the conditioned place for the painful sensation. Kulenkampff (15), also, discloses a unitarian conception in which he attempts to show that trigeminal neuralgia is not a condition for which the trigeminal nerve need be held responsible but a state of far more general origin. He bases his hypothesis upon the belief that sensitivity to pain is transmitted through the sympathetic system, thus permitting the theory of a possible psychically central conditioning of the trigeminal area. Tyler (296), among others, also blames sympathetic overactivity for the occurrence of the attacks, although apparently on a more definite organic basis.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

Whatever the causative factors and the pathology in trigeminal neuralgia, most authors are agreed that the diagnosis must be made directly.

Thus the diagnosis of trigeminal neuralgia still depends upon the subjective complaints of those suffering from it. We are quite safe in saying that little has been added to earlier descriptions of the condition in the years under review. Probably the greatest development in the improvement of diagnosis and differential diagnosis of the syndrome has been the clarification of ideas regarding various other types of face pain. The necessity of differentiating between "true" major trigeminal neuralgia and "atypical" facial pains is emphasized by many writers (10, 54, 158, 222, 358). As Ney (66) stated, "It is these cases of so-called 'atypical' facial neuralgia which remain a stumbling block in trigeminal surgery and are to be most carefully differentiated from the 'true' or 'typical' types of the disease."

Glaser (10) considered the salient diagnostic features of the facial neuralgias. He divided them as follows: trigeminal neuralgia, tumors of the gasserian ganglion, atypical neuralgias, sphenopalatine neuralgia, neuralgia of the seventh cranial nerve, neuralgia of the eighth cranial nerve, neu-

ralgia of the ninth cranial nerve, neuralgia of the tenth cranial nerve neuralgia due to malignant invasion of the various cranial nerves and dental pulp stone neuralgia

Frazier (54), in discussing the diagnostic problems in trigeminal neuralgia, noted that the diagnosis is usually possible directly from the symptoms and laid special stress upon the typical nature of the pain. In his opinion those cases with definite atypical manifestations are not true trigeminal neuralgia. He also called attention to some favorite diagnostic criteria: the patients usually have a high tolerance to morphine and morphine has scant effect upon the pain. These patients rarely, if ever, develop the narcotic habit. The pain of true trigeminal neuralgia usually does not interfere with the patient's sleep. The pain always adheres to the distribution of the fifth nerve on the side affected.

Grant (265) pointed out the necessary factors for a diagnosis of true neuralgia of the trigeminal nerve, which depend entirely upon a description of the character and distribution of the pain. The severity of the pain is such that pains of other varieties or in other parts of the body seldom compare with it. It is paroxysmal with occasional periods of complete remission, and is referred to the skin segments of the area supplied by the trigeminal nerve, radiating in a direction parallel to the main branches of the nerve. Grant also called attention to the other characteristics of the condition including the presence of the "trigger," or dolorogenic zone.

Horrax and Poppen (270-272) among others, advocate local anesthesia or alcohol injection as a diagnostic test in all cases of trigeminal neuralgia. Those cases that do not obtain relief following successful anesthetization by injection they would consider as atypical or as not true trigeminal neuralgia, and as such not suitable for operation. They are of the opinion that in addition to being a diagnostic test of merit the preliminary injection serves to adjust the patient to the anesthetic zone resultant from root section.

Grant (323) similarly advocated alcohol injection in certain cases as a diagnostic method. In the discussion of Grant's article Dandy states that he does not believe it necessary to use such diagnostic procedures in most instances while Jaeger expresses the opinion that failure of relief from injection of one branch of the nerve is not necessarily proof of the absence of trigeminal neuralgia.

TREATMENT

No one will deny the fact that, to date the achievements in the treatment of trigeminal neu-

ralgia have been greater than any gains in our knowledge of the causes of the disease. Thus, 'while in many diseases, therapeutic empiricism is fraught with danger, in this instance, therapy has far outstripped our knowledge of the fundamental facts' (Davis 206). Also it may be logically stated that, so long as such a condition holds there will be some dissatisfaction with the modes of treatment commonly employed and repeated efforts will be made to devise new and more satisfactory methods as well as to improve the technique of the old.

Most of the authors reporting specific conditions causing trigeminal neuralgia, as previously noted (97, 247, 276, 39, 95, 228, 16, 250, 93, 215) come to their conclusions because the painful attacks were seemingly relieved by treatment directed toward the cure of such conditions. Wholly aside from the question of etiology, these instances serve to emphasize the advisability of treating any local or generalized specific pathological processes found to be present in patients having trigeminal neuralgia.

While surgical methods occupy the attention of the greater number of writers on the subject in the period under review, a few report some success with varied types of medical therapy. The general failure of analgesics and even opiate to afford any marked measure of relief in trigeminal neuralgia is again noted (54, 206, 265).

While the use of trichlorethylene in the treatment of trigeminal neuralgia dates back to a time previous to the years covered in this article, a careful analysis of the benefits to be expected from its use has been given by Glaser (55). He found that about 15 per cent of the reported cases treated with this drug up to that time had been completely relieved of symptoms. The percentage of cases receiving partial relief varied with different investigators, from 13.3 per cent in his cases to as high as 74 per cent in the series of some others.

Inskerp (215) reported relief in a number of cases from the simple administration of one heaping teaspoonful of calcium gluconate in a glass of water thirty minutes before breakfast each morning. The subsidence of symptoms was gradual and took from seven to fourteen days to be complete. In some cases the ingestion of a small amount of calcium must be kept up indefinitely. In some cases with relapses after alcoholic debauches or severe respiratory infections the pain could be relieved as in the initial attack, by more calcium.

Ramond (342) obtained relief in one case by the use of ergotamine tartrate, together with a reg-

men directed toward general protein desensitization Tyler (296) reports a case in which there was marked relief for one year after 8 weekly injections of ergotamine tartrate.

Solito (124) reported on 3 patients, entirely free of lues, with essential neuralgia of the trigeminal nerve, who were relieved by gradually increasing dosages of arsphenamine administered intravenously. He based his treatment upon the previously reported work of Furno, to whom he refers as having treated 19 cases by this means together with quinine dihydrochloride by mouth. Because 2 of his patients received no quinine, Solito attributes his results entirely to the neoarsphenamine. Boehm (309) reports recovery in 3 cases of trigeminal neuralgia following the use of a Vitamin-B preparation called "betaxin." He gave the substance by injection in quantities of one ampule at frequent intervals (daily to three times weekly). He based his treatment upon the principle of vitamin deficiency as a cause of nervous disorders. Admitting the limited number of cases and the brief period of observation, Boehm nevertheless enthusiastically recommends this method of treatment.

The use of hyperpyrexia has its adherents. Ball (1) used injections of boiled milk for a hyperthermic reaction. He treated 10 patients, with complete relief or great amelioration of their symptoms. Boeckheler (147) induced fever in 7 patients with "pyrifer" administered intravenously in gradually increasing doses. Six had relief for the period under observation. One recurrence was found to be due to a dental granuloma and thus, according to the author, the condition was perhaps not originally trigeminal neuralgia. He advocates a high fever peak of relatively short duration and notes that a focal reaction of increased pain in the trigeminus is to be desired. The greater the pain during the fever, the better and more permanent the result. The number of treatments necessary varied from four to seven or eight.

Possibly closely allied to the treatment by general hyperpyrexia is the use of local diathermy or short-wave therapy. Lux (19) described a method of "ganglionic diathermy" based upon the theory of a vascular disorder or spasm about the ganglion. The diathermy is applied by means of two electrodes, one in the oculotemporal region of the affected side, the other at the nape of the neck. From ten to twenty treatments usually sufficed to bring about disappearance of the symptoms. Hanau (103) praises the method of Lux, calls attention to its complete innocuity, and notes that 75 per cent of the patients had good

relief and 25 per cent had more or less dolorous contraction from ten to twenty months after the treatments. He reports equally good results in recurrent cases and recommends the method for cases in which medication has not brought results, before more aggressive forms of treatment are undertaken. Koehler (275) used short-wave therapy (frequencies of from 50 to 20 million) in various affections of the face. He found it especially effective in affections of the trigeminus.

Moramarco (116) describes with technical particulars the diathermic and ionotherapeutic procedures for the treatment of trigeminal neuralgia. He indicates the good results in these cases obtained with ultraviolet, infra-red, and x-ray irradiations and reviews the different hypotheses offered in explanation of the action of these physical agents upon the neuralgia. Brunner-Ornstein and Guttman (198) used the cold quartz lamp in 40 cases of trigeminal neuralgia, applying it under slight pressure for from two to four minutes at each of the points of exit of the trigeminal nerve. They advise three treatments weekly, to be continued for a short time after the patient is free from pain. Eight patients were reported as completely recovered, 15 as very greatly benefited, and 10 as distinctly benefited, 5 were still under treatment and in 2 the condition was refractory. Ausch (142) also recommends this method. Loewenstein (168) summarizes ten years' experience with the use of radium emanation in the treatment of trigeminal neuralgia. The method consists of the application of salve bandages of radium emanation absorbed in vaseline from one to two hours at a treatment, from two to three times a week. A check-up of 23 cases treated during the period from 1930 through 1932 enabled the author to conclude that in about one-third of the cases under discussion trigeminal neuralgia was banished by this method. Sgalitzer (292) gives in detail his technique for the x-ray treatment of this condition. Essentially his newer technique consists of many small doses, from 30 to 50 roentgens, given for ten to fifteen consecutive days. This seems to eliminate the objectionable pain after irradiation experienced by some of his patients when his previous method, employing a higher dosage, was used. He notes that any eventual recurrences at the end of two and a half or three months may be treated in the same way.

Surgical methods of treating trigeminal neuralgia would seem still to be the most satisfactory. They are favored by many from the first, and most of those advocating less radical methods suggest surgery after their own means have failed. No startlingly new surgical methods have been

devised in the period under review here. Numerous technical changes in older methods have been suggested as improvements in treating patients suffering from this condition. All these procedures may be said to be directed toward the deafferentation of the area affected by the pain. The different methods of bringing this about all have their adherents.

Zenker (241) has carried on in Kirschner's clinic with the electrocoagulation of the gasserian ganglion employing Kirschner's apparatus, by the use of which it is considered possible to have the puncture needle arrive in the exact point in the gasserian ganglion that requires treatment. The needle is replaced with the electrocoagulation unit and coagulation is carried out. Of 107 patients who were treated for trigeminal neuralgia, 13 returned because of recurrences, 11 of whom were treated before Kirschner's apparatus was in use. The author stated that in true recurrences it was a case of incomplete elimination of sensibility at the time of operation. In all cases of recurrence, further treatment brought about permanent recovery.

Complications in the form of oculomotor muscle palsies, keratitis, and conjunctivitis were noted in some of their cases. Coole (314) has devised an instrument for the permanent destruction of nerve fibers in the maxillary and mandibular divisions by electrocoagulation. Essentially it is a long small trocar like needle through which may be passed a smaller needle for injection purposes or an insulated electrocoagulating element.

Injections of alcohol into the gasserian ganglion or the peripheral branches continue to be favored by many. Some consider the methods the preferential treatment in all cases and advise them to the exclusion of open surgical methods (57, 104, 266, 326). Others consider alcohol injection advisable as a means of temporary relief of pain for those patients who are unwilling or unable to have operative interruption of the tracts by which the painful stimuli reach the brain (172, 225, 270, 323).

Haertel (266) reports upon his cases of injection into the ganglion and notes some refinements in his technique. These consist mainly in the use of x rays to localize the foramen ovale through which the ganglion injection is made and the use of smaller quantities of alcohol (not more than 0.3 c.c.). Sixty-eight per cent of his patients had total permanent anesthetics, while 32 per cent had partial permanent anesthetics. Among those having total anesthetics only 4 per cent had recurrences while among those having partial anesthetics 70 per cent had recurrences. He states

that when one plans a total anesthesia the injection should be made as near the sensory root as possible. Haertel answers the criticisms of his method by stating that the technique is not more difficult than other surgical means and in general the complications are less damaging than those at times following operation. He thinks the new method of coincidental x-ray examination and smaller dosages of alcohol removes the objections that the surgeon is working in the dark and that good results are obtained in the hands of only a few specialists.

Harris (104, 326) also makes a good case for the proponents of alcohol injection into the ganglion. He warns that just as operations upon the ganglion and root require a high degree of neurosurgical skill so the injection of alcohol requires long practice and familiarity with the anatomy, the methods of injection, and their difficulties in order to produce the best results and should, therefore, be left to the hands of experts.

Irger (216) gives us a supplemental report of his method of injecting the ganglion which he believes is superior to that of Haertel. It is an intramandibular approach in contradistinction to Haertel's extramandibular route. It is based on the finding that the foramen ovale is in a sagittal plane with the top of the articular tubercle of the mandible and in line with the angle of the jaw, thus forming an isosceles triangle which gives out the proper measurements and directions.

Putnam and Hampton (340) describe a modification of Haertel's method of injection into the ganglion in which the puncture is made during a brief period of anesthesia and the position of the needle is established by means of x-rays taken during the procedure.

Morris (65) having studied numerous anatomical specimens reviewed the anatomy of Haertel's method. He believes the high "horizontal" Haertel route to be the most accurate and suggests that with its use it is the sensory root and not the ganglion tissue itself that is affected by the alcohol. If this is so he states the results obtained may be expected to be permanent and so compare with those obtained by major operation.

Horraz and Poppen (270, 271) advocate more alcohol injections preliminary to surgery. They would inject practically all cases for two main reasons: to make certain of the diagnosis and to adjust the patient to the anesthetic zone. Poppen (225) states that in dealing with trigeminal neuralgia one must remember that the treatment is largely a matter of choice and that the patient should be permitted to choose the treatment he prefers after the courses that may be followed.

alcohol injection or operation, have been thoroughly explained to him

Van den Berg (299) has devised an instrument to be used as a guide for the needle during deep alcoholic injections into the mandibular or maxillary divisions. It is reversible and thus fits on either side of the head

Flynn (261) has reported upon 150 cases treated by alcohol injection. The average duration of relief in his cases was seventeen months. This compares favorably with the duration of relief obtained by most other observers (270, 271, 323) making injections peripheral to the ganglion.

Emphasizing a possible increased risk in operations upon patients who have had previous alcohol injections, Wakeley and Reid (79) report a case of attempted operation via the temporal approach in which many dense adhesions were encountered in the neighborhood of the ganglion. A severe hemorrhage occurred in this area, and although it was finally controlled by packing, the patient succumbed. They attributed this complication to adhesions from many previous alcohol injections. Loessl (280), in the course of an operation for trigeminal neuralgia by the temporal route, found a cyst of the gasserian ganglion which he attributed to numerous previous alcohol injections. He notes that Lexer, Schmieden, and Peiper, as well as a number of other surgeons, met with such grave changes induced by alcohol injection that later operation became impossible. He cites these factors as the reasons why many surgeons prefer operation to alcohol injections.

Much of the progress made in the operative treatment of trigeminal neuralgia during the years under consideration has consisted in placing the procedure of partial section of the root upon a firmer physiological and anatomical basis. It goes almost without saying that practically all surgeons advise saving the motor root whenever possible and the root fibers to the ophthalmic division in most cases in which that branch is not primarily involved in the neuralgia.

From anatomical observations made upon ganglia and nerve roots of human adults, Van Nieuhuys (130) sought to demonstrate that the sensory root of the fifth nerve is not composed of three parts that correspond to the three peripheral branches from the gasserian ganglion, and that since the operation of partial section of the sensory root is not based on anatomical facts, it cannot be regarded as an absolutely reliable procedure. Spiller and Frazier (184) summarize their anatomical and clinical evidence for the logic of the subtotal section. Wilkins and Sachs (188), in recording the areas of sensory loss following par-

tial section of the posterior root in a series of 26 cases, found evidence that, while there was some interlacing and crossing of the fibers in a variable arrangement, in general the partial section could be performed satisfactorily by divisions. Also, Davis and Haven (156), by anatomical and embryological observations in the human being and by experimental sections in animals, demonstrated a rather definite pattern followed by the fibers of the various divisions in the posterior root, thus lending further support to the logic of partial selective section of the root.

Dandy (92) continues to favor the cerebellar route and cites its advantages as follows: an absence of keratitis, a lack of injury to the motor root, no injury to the facial nerve, and a possibility of uncovering tumors causing neuralgia without giving rise to other symptoms. Van Wagenen (78), in a report of 5 cases operated upon by Dandy's method, was impressed with the idea that, while the operation is considerably more hazardous and difficult than that through the temporal route, it is a valuable adjunct to the neurosurgical armamentarium. He found no evidence that the type or area of anesthesia differed from that which occurs when the trigeminal root is sectioned via the temporal route if the root is totally divided. In 2 instances where only the lower half of the root was sectioned he found a preservation of sensation over the face in all but a few localized areas.

Stubbe (348) thinks that his experimental work on monkeys shows a crossing and a segregation of the fibers in the sensory root of the fifth nerve into spinal and principal nucleus fibers, which division can properly be interpreted as a functional division into pain and touch fibers. He further found a large number of sensory nerve cells in the sensory root. These were in scattered groups, often quite close to the pons. Thus he believes that section of the root distal to these, as practiced by Frazier, does not rule out the possibility of regeneration of the fibers. Peters (285) also found sensory nerve cells in the posterior root of both man and animals, which he believed offered a possible explanation of the return of sensation in some cases operated upon with section of the root near the ganglion.

Two new methods of approach to the ganglion or sensory root have been described. Ruttin (28) has devised a technique by means of which the ganglion may be approached surgically either for removal or for injection. It consists of incision over and behind the ear and removal of the bone of the upper wall of the auditory canal and part of the floor of the middle fossa, without opening

devised in the period under review here. Numerous technical changes in older methods have been suggested as improvements in treating patients suffering from this condition. All these procedures may be said to be directed toward the deafferentation of the area affected by the pain. The different methods of bringing this about all have their adherents.

Zenker (241) has carried on in Kirschner's clinic with the electrocoagulation of the gasserian ganglion, employing Kirschner's apparatus, by the use of which it is considered possible to have the puncture needle arrive in the exact point in the gasserian ganglion that requires treatment. The needle is replaced with the electrocoagulation unit and coagulation is carried out. Of 707 patients who were treated for trigeminal neuralgia, 13 returned because of recurrences, 11 of whom were treated before Kirschner's apparatus was in use. The author stated that in true recurrences it was a case of incomplete elimination of sensibility at the time of operation. In all cases of recurrence, further treatment brought about permanent recovery.

Complications in the form of oculomotor muscle palsies, keratitis and conjunctivitis were noted in some of their cases. Cooke (314) has devised an instrument for the permanent destruction of nerve fibers in the maxillary and mandibular divisions by electrocoagulation. Essentially it is a long small trocar like needle through which may be passed a smaller needle for injection purposes or an insulated electrocoagulating element.

Injections of alcohol into the gasserian ganglion or the peripheral branches continue to be favored by many. Some consider these methods the preferential treatment in all cases and advise them to the exclusion of open surgical methods (57, 104, 266, 326). Others consider alcohol injection advisable as a means of temporary relief of pain for those patients who are unwilling or unable to have operative interruption of the tracts by which the painful stimuli reach the brain (172, 225, 270, 323).

Haertel (266) reports upon his cases of injection into the ganglion and notes some refinements in his technique. These consist mainly in the use of x rays to localize the foramen ovale through which the ganglion injection is made and the use of smaller quantities of alcohol (not more than 0.3 cc.) Sixty-eight per cent of his patients had total permanent anesthetics while 32 per cent had partial permanent anesthetics. Among those having total anesthetics only 4 per cent had recurrences, while among those having partial anesthetics 70 per cent had recurrences. He states

that when one plans a total anesthesia the injection should be made as near the sensory root as possible. Haertel answers the criticisms of his method by stating that the technique is not more difficult than other surgical means and in general the complications are less damaging than those at times following operation. He thinks the new method of coincidental x ray examination and smaller dosages of alcohol removes the objections that the surgeon is working in the dark and that good results are obtained in the hands of only a few specialists.

Harris (104, 326) also makes a good case for the proponents of alcohol injection into the ganglion. He warns that just as operations upon the ganglion and root require a high degree of neurosurgical skill, so the injection of alcohol requires long practice and familiarity with the anatomy, the methods of injection, and their difficulties in order to produce the best results and should therefore, be left to the hands of experts.

Irger (216) gives us a supplemental report of his method of injecting the ganglion, which he believes is superior to that of Haertel. It is an intramandibular approach in contradistinction to Haertel's extramandibular route. It is based on the finding that the foramen ovale is in a sagittal plane with the top of the articular tubercle of the mandible and in line with the angle of the jaw thus forming an isosceles triangle which gives one the proper measurements and directions.

Putnam and Hampton (340) describe a modification of Haertel's method of injection into the ganglion in which the puncture is made during a brief period of anesthesia and the position of the needle is established by means of x rays taken during the procedure.

Morris (65) having studied numerous anatomical specimens, reviewed the anatomy of Haertel's method. He believes the high 'horizontal' Haertel route to be the most accurate and suggests that with its use it is the sensory root and not the ganglion tissue itself that is affected by the alcohol. If this is so, he states, the results obtained may be expected to be permanent and so compare with those obtained by major operation.

Horrax and Poppen (2, 20, 271) advocate more alcohol injections preliminary to surgery. They would inject practically all cases for two main reasons: to make certain of the diagnosis and to adjust the patient to the anesthetic zone. Poppen (225) states that in dealing with trigeminal neuralgia one must remember that the treatment is largely a matter of choice, and that the patient should be permitted to choose the treatment he prefers after the courses that may be followed.

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of the tympanic cavity. The dura is then elevated off the floor of the middle fossa as far as the tip of the pyramid and over the ganglion.

Maxwell (335) describes a procedure which permits section of the root in the posterior fossa with a temporal approach. He makes the regular temporal opening, and lifts the dura back as usual to sever the middle meningeal nerve at the foramen spinosum and to identify the third division at the foramen ovale. Using the latter as a guide, he elevates the dura posteriorly and medially to a point on the petrosal crest between the trigeminal groove and the internal acoustic meatus. The petrosal sinus is then lifted and the dura separated from the posterior petrosal surface for a distance of about 25 in. An incision through the dura beneath the petrosal sinus in this location permits access to the root in its course between the pons and the cave of Meckel. The author clamps and cuts the root in this location and avulses the proximal segment from the pons.

From the standpoint of the surgical anatomy of the temporal approach, Chang (251) records what he considers a possible difference between the Eastern and the Western skull as regards the morphology of the middle fossa. He states that the bony eminence frequently found in front of or hiding the foramen ovale in the Western skull has never been noted by him in Eastern skulls.

Frazier (53), in a general summary of his experiences with 654 radical operations for trigeminal neuralgia, gives us a very thorough and favorable report on this method of treating the condition. He notes among other complications frequently following the radical procedure the herpetic eruption which may appear on the face and buccal cavity, usually in the distribution of the maxillary division about the second or third postoperative day. He notes as have many others that the occasional facial palsies following the radical operation tend to disappear in practically all instances.

Some unusual sequelae of the radical operation have been reported during this period. Loveman (169) found a rare sequel in the form of a zosteriform ulceration and alopecia in the area of anesthesia produced by the operation. Clinically some of the ulcers resembled carcinomas but histologically they revealed only acanthosis and pseudo-epitheliomatous hyperplasia. Following x-ray therapy all of the ulcers healed. Netherton (174) reported a case in which a subtotal section of the root including the first and second divisions had been carried out. A year later erythematous plaques developed over the anesthetic area. They varied in acuity but remained permanent.

It is difficult to generalize regarding the best method of treating trigeminal neuralgia at the present time. Proponents of both the injection method and the operative method have much in their individual favors. Many are inclined to agree with Taylor (187), who concludes that radical operation is safer than alcoholic injection of the ganglion. The latter procedure as we may note, at times affords comparatively permanent relief (Haertel 266), but not in all cases (Loessl 280), while practically all agree that deep injection of the peripheral branches is a relatively temporary procedure. In this regard, Jefferson (62) states: "The claims of alcohol injection have been most ably and convincingly pleaded in this country but sufficient evidence is now available to show that operation is in general superior to injection and should therefore be more widely employed." Similarly Paterson (139) after an inclusive review, advocates partial section of the sensory root in all cases fit for a general anesthetic, reserving alcohol injection for patients who because of age or general condition are unfit for surgery.

SUMMARY

In the past few years much has been accomplished in increasing our knowledge concerning the mechanisms involved in the mediation of painful sensations. The exact etiology and pathology of trigeminal neuralgia, however, is still obscure.

Diagnosis of the syndrome has been placed upon a fairly satisfactory basis.

Methods for the relief of the suffering patient have far outstripped our basic understanding of the condition. It is possibly to be regretted that relief from the pains of trigeminal neuralgia must be accompanied by a loss of some types of sensory perception over the affected zones. May we hope that as our knowledge of the condition increases even better methods of treatment will be evolved.

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BRAIN AND ITS COVERINGS, CRANIAL NERVES

Pilcher, C.: Experimental Cerebral Trauma: The Fluid Content of the Brain After Trauma to the Head. *Arch Surg*, 1937, 35 512

In an effort to determine the effect of trauma to the head on the fluid content of various portions of the brain and on the volume outflow of cerebrospinal fluid, as well as to determine the effect of the intravenous administration of hypertonic solution of dextrose in traumatized animals, Pilcher devised an extensive plan of experimentation on dogs, the brain of which he traumatized under constant conditions. He was repeatedly able, by dropping a 500 to 1,000 gm weight on the head from a height of 60 inches, to produce sufficient cerebral injury to effect a definite elevation in the cerebrospinal fluid pressure. The fluid content, which had been studied separately for the gray and white matter, was only slightly increased, if at all, above the average normal level. The small average increase in cerebral fluid content was not believed to be sufficiently great to account for the elevation of the cerebrospinal fluid pressure. Therefore, contrary to the more prevalent idea, the author believes there is no conclusive evidence to prove the existence of marked cerebral edema following craniocerebral trauma. It is his opinion that other factors, viz., a possible alteration in the volume of the intracranial blood, or of the cerebrospinal fluid content, may be the cause of increased intracranial pressure, and that these are of greater importance than the so-called cerebral edema in such trauma.

JOHN MARTIN, M D

Robertson, E. G.: Epilepsy as a Symptom of Organic Lesions of the Brain. *Med J Australia*, 1937, 2 331

In idiopathic epilepsy the cause is, as yet, undiscovered, in the symptomatic form one of the many known causative factors is present. In considering many of the problems of epilepsy, one should remember that there is an underlying "epileptic tendency," in the presence of which many factors may precipitate an epileptic attack.

Epilepsy arising from organic lesions of the brain may have some localizing symptoms, these depend upon the site of the lesion. Those arising from the precentral convolution or premotor area are of the nature of *petit mal*, simple loss of consciousness and generalized convulsion with or without the turning of head and eyes to the opposite side. If the attack arises in the "frontal adversive field," the turning of the head and eyes may precede the loss of consciousness. The further the lesion is placed anteriorly, the less is the tendency to strong preliminary deviation of the head and eyes. If the focus is in the postcentral convolution the sensation spreads in a manner corresponding to the grouping of the cells there, and motor convulsions are apt to end the attack. If the focus is in the receptor cells of the occipital lobe, the aura is a crude visual one, usually

of colored or uncolored lights, while if it is situated more anteriorly or the process spreads, visual disorientation may be a component of the attack. In the temporal lobe, auditory hallucinations are present, these may rarely consist of formed words, or sometimes the patient notes "a silence" as a part of the attack. If the focus is in the left side in right-handed persons, inability to speak with subsequent nominal aphasia may be prominent. Uncinate attacks are epileptiform in character and manifest themselves in many ways. The patient may complain of various odors or bad smells though often he will not admit of an olfactory aura. Many cases will be missed if the physician waits for a fully described attack. With these attacks there may be a dreamy state as in other forms of epilepsy with "turning inward of the consciousness."

The later in life that the epilepsy has its onset, the more likely that a definite cause may be found. Among the pathological lesions that may initiate the condition, cerebral tumor is the commonest cause of epilepsy beginning in middle life. Any form of tumor may cause epilepsy. In older persons intracranial aneurysms are a commoner cause than is usually realized. In the presenile period, cerebral degenerative lesions are a common cause of the condition. Traumatic damage and vascular degeneration are likewise fairly common causes of epilepsy. In early life there may be varied causes, such as developmental defects, birth injuries, embolism, hemorrhage, sclerosis, cystic degeneration, and infections of various sorts.

The exact nature of the epileptic process is poorly understood. The electro-encephalograph has opened a door to the study of the condition, but as yet it is too early to know whence it will lead.

In the treatment of the condition it is important that vigorous measures be taken early in the course of the disease, for every attack facilitates the occurrence of others. The use of anti-convulsant drugs in sufficient dosage is indicated. The best of these are bromides and phenobarbital. Organic lesions should be attacked surgically if this is feasible.

JOHN WILTSE EPTON, M D

Craig, W McK: Facial Paralysis and Its Surgical Treatment. *Surg Clin North Am* 1937, 17 1093

Facial paralysis may be acute or chronic, central or peripheral. A spontaneous cure may occur with expectant treatment or after the removal of a causative factor, but the paralysis may persist in spite of treatment. If signs of improvement do not occur within six months, the chances of a spontaneous cure are very slight and surgical measures should be considered.

Many operative procedures have been recommended, including dissection, suture, graft of the facial nerve in the facial canal, suture of the facial nerve to other cranial nerves, especially the spinal accessory or the hypoglossal, and removal of the superior cervical sympathetic ganglions. Each case should be considered very carefully before any surgi-

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matic approach, which he prefers. His studies on the cadaver demonstrate that with this method the liquid diffuses upward to the sixth dorsal vertebra, infiltrating the corresponding ganglia, and, taking in the lesser splanchnic nerve, is arrested below at the pillars of the diaphragm. In the living subject, roentgenograms after injection of uroselectan B show diffusion along the opposite side of the spine to the level of the sixth vertebral body and into three intercostal spaces on both sides following the nerve, and penetration downward to the first lumbar vertebra.

He reports 62 cases of hypertension treated by alcohol infiltration of the left splanchnic nerve. In one-half the cases no secondary phenomena occurred, while in the others on the third or fourth day there were pains localized deep in the spine, unrelated to position or movement, and usually nocturnal. They were possibly due to the action of the alcohol on the periosteum, and disappeared between the eighth and tenth days.

The blood pressure dropped from 30 to 40 mm within a few minutes after injection, and in a considerable number of patients this decrease con-

tinued. The results after a number of months depended on the underlying condition. They were very gratifying in cases without anatomical lesions, particularly the hypertension of diabetes without renal lesions. The effect in successful cases appeared to last more than a year, but further observations are necessary for more exact data. In 3 cases in which there was no improvement after alcohol injection, resection of the splanchnic nerve was also without result.

The author believes that the simple and harmless procedure of alcohol infiltration is not only the means of obtaining an immediate therapeutic effect, but also the most reliable criterion for the selection of cases suitable for splanchnic resection. If infiltration is unsuccessful, more complicated interventions are unjustifiable. A permanent decrease in the blood pressure is, however, an indication to consolidate the result by resection. The operation should be limited to resection of the splanchnic nerve and the pole of the semi-lunar ganglion to which it is distributed.

The article is accompanied by illustrations and references.

M E MORSE, M D.

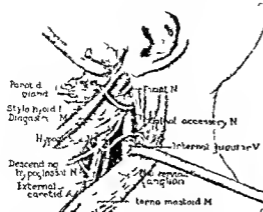


Fig 1 Schematic drawing representing (a) suture of the proximal end of the spinal accessory nerve to the distal end of the facial nerve (b) suture of the proximal end of the descendens hypoglossi nerve to the distal end of the spinal accessory nerve and (c) division and resuturing of the superior cervical ganglion. These three procedures are done to promote recovery of facial movements to prevent atrophy of the muscles supplied by the spinal accessory nerve and to produce temporary enophthalmus.

cal procedure is attempted and the operation best suited to the case should be used. Nerve suture either alone or with cervical sympathectomy, seems to be the most efficacious method of overcoming the deformity.

SPINAL CORD AND ITS COVERINGS

Paltrinieri M. Paralytic Sciatica from Posterior Herniation of a Degenerated Lumbar Disc (Sciatica paralizzante da ernia posteriore di un disco lombare degenerato). *Chir. d'organi di movimento* 1937 23 97.

Paralytic sciatica according to Putti is characterized by dissociated usually unilateral paralyses or pareses of the external popliteal nerve occurring after attacks of sciatica which have recurred over many years. Once established the paralysis does not regress. In 1936 Paltrinieri published a report of 17 cases of this syndrome due to various diseases of the lumbar segment such as congenital defect and spondylitis. He has seen it also in 4 other patients with tuberculosis of the lumbar spine especially of the transverse processes. When a motor defect in the distribution of the sciatic nerve is associated with pain and trophic and sensory disturbances one should be cautious in considering that the compression is in the spinal foramen and should turn the attention to the vertebral body disc and meninges which are closely connected with the cauda equina.

The author reviews the reported cases of unilateral compression of the roots of the cauda equina due to a herniated disc reviews the symptomatology and diagnosis and adds another case. He believes that

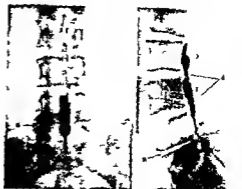


Fig 1 (a) Disc undergoing fibrous degeneration (b) narrowing of the lipodol column at the level of the fifth lumbar vertebra due to concomitant arachnoiditis (c) bending of the lipodol column and (d) posterior impressions on the opaque column of the discs between the second and third and the third and fourth lumbar vertebrae.

the purely mechanical theory is insufficient, and that an alteration of the disc always precedes its retro-pulsion. The roentgenogram is not always decisive either because the disease of the disc is early, or because traumatic changes predominate. In such cases myelography gives more information than radiography.

The author's patient was a woman fifty-three years old who had suffered from intermittent left-sided sciatica for ten years. After an especially acute attack she developed drop-foot, equinus and muscular atrophy associated with hypoesthesia of the antero-external surface of the leg and dorsum of the foot. The spinal fluid was normal as to composition and pressure.

The roentgenogram (Figure 1) showed narrowing of the space between the fourth and fifth lumbar vertebrae, eversion of their anterior free margin, and arrest of the lipodol column at the level of the fifth lumbar vertebra with a 'rat tail' thinning and a 'bullet' appearance in the meningeal cul-de-sac. In the lateral view a bending of the column between the fourth and fifth bodies was seen apparently caused by the protrusion of the disc into the cavity.

The patient refused a laminectomy.

The article is accompanied by roentgenograms, an anatomical diagram and references.

M. J. MORSE, M.D.

SYMPATHETIC NERVES

Valdoni P. Alcohol Injection of the Splanchnic Nerve and Thoracic Sympathetic Chain in the Treatment of Hypertension (L'alcolizzazione del nervo splanchnico e della catena toracico-simpatica nella cura dell'ipertensione). *Ibidem* Rome 1937 44 sc. chir. 538.

Valdoni describes the technique of alcohol infiltration of the splanchnic nerve by the suprarenal plexus.

the fifth decade, but fall little thereafter. Beginning about the sixtieth year the results gradually improve so that the results are from 100 to 150 per cent better than those where no prophylactic radiation has been administered.

These results are so markedly different that one cannot ascribe them to the limits of error. Of a total of 1,125 cases of mammary cancer in the female, the five-year cures in those without radiation were 29.8 per cent, and the ten-year cures 15.4 per cent, in those with prophylactic radiation the five-year cures were 52 per cent, and the ten-year cures 34.1 per cent. This difference was seen in the author's cases over a period of twenty years. During the individual years, the results showed small differences, but the prophylactically radiated cases always showed a far better result. In three time periods the results were 20 per cent in 1912, 26 per cent in 1921, and 31 per cent in 1927 for the non-irradiated cases, while in the irradiated cases they were 50.0, 52.6, and 55.3 per cent, respectively. Therefore, if prophylactic irradiation were practiced throughout Germany, many lives would be saved each year.

WILLIAM C. BECK, M.D.

TRACHEA, LUNGS, AND PLEURA

Eloesser, L.: Blocked Cavities in Pulmonary Tuberculosis. *J. Thoracic Surg.*, 1937, 7:1

The author summarizes his article on blocked cavities in pulmonary tuberculosis as follows:

Tuberculous bronchial stenosis and especially stop-valve stenosis play a rôle in the production of excavation. Destructive ulceration of the more rigid pulmonary framework and inflation of the resilient lung lead to excavation. Cavities produced in this way are doubtful and present "annular shadows."

The diagnosis of obstruction of a cavity may be made (1) by means of radiography with and without opaque substances, (2) by needling, and (3) by bronchoscopy.

In the treatment of this condition suction drainage has been disappointing, the results of thoracoplasty are doubtful, and thoracoplasty with apicolysis is inadvisable.

Open packing has been found to be curative, but it is restricted in its application and troublesome. The possibility of resection of the cavity or lobectomy is considered.

CARL R. STEINKE, M.D.

Neuhof, H.: The Free Transplantation of Fat for the Closure of Bronchopulmonary Cavities (Lattice Lung). *J. Thoracic Surg.*, 1937, 7:23

The features of the lesions for which fat transplantation has been employed are described briefly, the technique is indicated, and the reports of 17 cases in which the operation was employed are given.

The criteria for a successful free tissue graft are a sterile field, a bed capable of vascularization, and a field free from dead spaces, in which immobilization is feasible after transplantation. None of these criteria existed in any of the reported cases.

Concerning the results, complete healing occurred in 11 cases. The result could be termed a partial success or partial failure in 3 cases, and a complete failure in 3. The sizes of the cavities varied greatly. Some of the cavities were of recent origin and others of long duration.

Neuhof states that there have been several additional cases of fat transplantation, all successful, since this article was prepared for publication.

CARL R. STEINKE, M.D.

Pruvost, P., and Quénu, J.: The Exploration of Large Pulmonary Abscesses by Means of Trans-parietal Injection of Lipiodol (*L'exploration des grands abcès pulmonaires par l'injection trans-pariétale de lipiodol*). *Presse méd.*, Par., 1937, 45:1397

Pruvost and Quénu note that radiologists generally admit that it is impossible to introduce lipiodol into a pulmonary abscess by way of the bronchi except in the case of bronchiectatic abscess. However, if treatment by drainage of the abscess cavity without lobectomy or pneumectomy is contemplated it is evident that roentgenological examination by the usual methods does not give sufficient data for the guidance of such an operative procedure. Such data in regard to the extent of the abscess and the site most favorable for drainage can be obtained by roentgenological examination after injection of lipiodol into the abscess cavity through the wall of the thorax. This method is not suitable for all types of pulmonary abscess, but is used especially for large and superficial abscesses.

In the use of this method, the first procedure necessary is to make plain roentgenograms in two positions, the anteroposterior and the lateral. This indicates the position of the abscess and the fluid level. The lipiodol is then introduced into the abscess cavity, as located by these roentgenograms, with a needle attached to a syringe, and not with a trocar. This method involves no injury to the lung tissues. When the needle is introduced, pus is withdrawn from the abscess cavity, and from 5 to 10 ccm of lipiodol are injected. After the injection of the lipiodol, roentgenograms are made with the patient in various positions with the patient seated, the anteroposterior and lateral roentgenograms, with the patient in dorsal decubitus, and with the patient lying on the unaffected side.

The authors report 2 illustrative cases with roentgenograms showing how clearly the latter revealed the size and shape of the abscess cavity after the injection of lipiodol. In both cases drainage was successfully carried out, and roentgenograms which were taken after the wound was closed showed that the abscess cavity had disappeared. In both cases the lipiodol clearly demonstrated the presence of a fistula between the abscess and a bronchus, and showed clearly the size and course of this fistula. In 1 case it also demonstrated a diverticulum from the main abscess cavity, which, incompletely drained by the drainage of the large cavity, caused a recur-

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Hintze A The Occurrence and Prevention of Metastases as Judged from Carcinoma of the Breast (Kurzjiv und Metastase Entstehung und Verhütung dargestellt am Beispiel des Mammacarcinoms) 61 Tag d deutsch Ges f Chir Berlin 1937

The spread of metastases from a breast carcinoma depends on the location of the primary growth. If the growth is lateral and distal to the thorax or medial and proximal to the thorax the axillary glands in 8₃ per cent or the parasternal glands in the sternomastoid angle or the mediastinum in 15 per cent, will become affected next. The spread then continues into the lung and pleura and then through the mediastinum into the lung and pleura on the opposite side as well as through the lymph vessels into the lymph glands on the opposite side. This is demonstrable in the roentgen film. A spread to the axillary glands and other breast may also occur by way of the cutaneous lymphatics without affecting the other lung. From the mediastinum there may be a spread through the para aortic and paravertebral glands into the abdomen to produce metastases in the peritoneum and omentum. The growth may also spread into the liver pancreas kidneys stomach or spleen. It may follow the lymph vessels which accompany the blood vessels and thus reach the skeletal system first invading the thoracic spine, the lumbar spine then the pelvis and the upper portion of the femur. These various types of spread may be observed singly or in combination.

The endocrine glands appear to play a special part in the metastasizing process. The hypophysis thyroid adrenals and the ovaries are often involved far more than would be suspected from the size of these glands and often symmetrically. The endocrine glands must therefore be considered as carcinophilic the spleen and the skeletal system as carcinophobic. It is characteristic that the pectoralis muscle and the intercostal muscles are easily eaten away by the growing tumor while distant metastases in the muscles are practically unknown. The direct spread may be compared to the advance of an army which overcomes all obstacles in its way while the distant metastases occur as vessel emboli of which thousands perish before one successfully starts growing. The constant throwing out of pieces of tumor tissue with their resulting decomposition produces a protein reaction which is the cause of the cachexia. The patient therefore does not die from the metastases which he has but rather from the metastases which he does not have as they constitute the cause of the foreign protein reaction.

The character of the recipient tissue is of utmost importance for the settlement of carcinoma cells in the different tissues and their prognosis. The car-

cinomas of a low degree of differentiation are in marked contrast to those of high differentiation. Of the former group the most virulent is the diffuse carcinoma which produces a marked inflammatory reaction. The author has never secured a cure in cases harboring this type. On the opposite end of the scale is the colloid cancer, in cases of which the author has secured a 100 per cent five year cure and many ten year cures. The majority of the cases present carcinomas with a moderate degree of differentiation. Of the cases of carcinoma solidum simplex the author was able to cure 40 per cent for the five year period. In cases of medullary carcinomas as well as scirrhous types he obtained a five year cure in 29 per cent. Of the patients with adenocarcinoma 50 per cent were alive at the end of five years.

The scale of differentiation of the carcinoma was also visible in the rapidity of the spread and the number and size of the metastatic processes. The same scale appeared to bear some relationship to the age of the patient in which the carcinoma made its appearance. In the cases of colloid carcinoma the average age of the patient was sixty years while in adenocarcinoma it was fifty three and two-tenths years. The average age of the patient with carcinoma simplex was forty eight and eight tenths years while in inflammatory carcinoma it was thirty five years. The circumstances which enhance or delay the spread of cancer may be summarized in the following manner.

Cancer may be favored by

- 1 Youth pregnancy and lactation
- 2 Location in the medial or lower quadrant of the breast
- 3 A low state of differentiation
 - a Small cellular growth
- 4 Trauma palpation and massage
 - a Incomplete surgery
- 5 Lowered resistance

Cancer may be retarded by

- 1 Advanced age senile involution
- 2 Location in the lateral segment
- 3 Higher differentiation
- 4 Colloid degeneration
- 5 Radical surgery with pre-operative and post operative radiation
- 6 Raising of the hormonal resistance

The author considers the best weapons against breast cancer to be radical surgery and radiation preferably combined. Only by the use of prophylactic radiation may the metastases be reduced. The author remarks that the operation as well as the radiation produces certain biological changes in the organism. Thus the purely operative results improve till the fifth decade and then gradually decline. The prophylactic radiation improves the results about 75 per cent. The results also improve until about

the fifth decade, but fall little thereafter. Beginning about the sixtieth year the results gradually improve so that the results are from 100 to 150 per cent better than those where no prophylactic radiation has been administered.

These results are so markedly different that one cannot ascribe them to the limits of error. Of a total of 1,125 cases of mammary cancer in the female, the five-year cures in those without radiation were 29.8 per cent, and the ten-year cures 15.4 per cent, in those with prophylactic radiation the five-year cures were 52 per cent, and the ten-year cures 34.1 per cent. This difference was seen in the author's cases over a period of twenty years. During the individual years, the results showed small differences, but the prophylactically radiated cases always showed a far better result. In three time periods the results were 20 per cent in 1912, 26 per cent in 1921, and 31 per cent in 1927 for the non-irradiated cases, while in the irradiated cases they were 50.0, 52.6, and 55.3 per cent, respectively. Therefore, if prophylactic irradiation were practiced throughout Germany, many lives would be saved each year.

WILLIAM C. BECK, M.D.

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CARL R. STEINKE, M.D.

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CARL R. STEINKE, M.D.

Pruvost, P., and Quénu, J.: The Exploration of Large Pulmonary Abscesses by Means of Transparietal Injection of Lipiodol (L'exploration des grands abcès pulmonaires par l'injection transparietale de lipiodol). *Presse méd*, Par, 1937, 45, 1397.

Pruvost and Quénu note that radiologists generally admit that it is impossible to introduce lipiodol into a pulmonary abscess by way of the bronchi except in the case of bronchiectatic abscess. However, if treatment by drainage of the abscess cavity without lobectomy or pneumectomy is contemplated it is evident that roentgenological examination by the usual methods does not give sufficient data for the guidance of such an operative procedure. Such data in regard to the extent of the abscess and the site most favorable for drainage can be obtained by roentgenological examination after injection of lipiodol into the abscess cavity through the wall of the thorax. This method is not suitable for all types of pulmonary abscess, but is used especially for large and superficial abscesses.

In the use of this method, the first procedure necessary is to make plain roentgenograms in two positions, the anteroposterior and the lateral. This indicates the position of the abscess and the fluid level. The lipiodol is then introduced into the abscess cavity, as located by these roentgenograms, with a needle attached to a syringe, and not with a trocar. This method involves no injury to the lung tissues. When the needle is introduced, pus is withdrawn from the abscess cavity, and from 5 to 10 c cm of lipiodol are injected. After the injection of the lipiodol, roentgenograms are made with the patient in various positions with the patient seated, the anteroposterior and lateral roentgenograms, with the patient in dorsal decubitus, and with the patient lying on the unaffected side.

The authors report 2 illustrative cases with roentgenograms showing how clearly the latter revealed the size and shape of the abscess cavity after the injection of lipiodol. In both cases drainage was successfully carried out, and roentgenograms which were taken after the wound was closed showed that the abscess cavity had disappeared. In both cases the lipiodol clearly demonstrated the presence of a fistula between the abscess and a bronchus, and showed clearly the size and course of this fistula. In 1 case it also demonstrated a diverticulum from the main abscess cavity, which, incompletely drained by the drainage of the large cavity, caused a recur-

rence of the symptoms. As the position of this diverticulum was clearly shown it was all drained with complete and permanent relief of the symptoms.

Repeated roentgenograms showed that the lipiodol disappeared rapidly from the pulmonary tissue while lipiodol introduced into the pleural cavity often persisted for many months. The authors conclude therefore that the transarterial injection of lipiodol into a pulmonary abscess if superficial is practically without danger moreover it facilitates satisfactory drainage of the abscess which results in the cure of lesions that are otherwise very difficult to treat successfully.

ALICE M. MEYERS

HEART AND PERICARDIUM

Shipley A. M. Pericarditis. *J. Am. M. Ass.* 1937 109 1017

This paper is limited to the discussion of the various types of pericarditis.

In coronary thrombosis pericarditis with effusion is sometimes present. This may be confined to the area of infarction and the amount of fluid may be very small. Occasionally however it is large.

Suppurative pericarditis is not rare. There are two chief avenues of approach for drainage: the anterior and the posterolateral. The anterior operation may be trans sternal, right or left parasternal chondroxyphoid or a combination of the trans sternal and left parasternal types. In late cases with a large amount of effusion a posterolateral approach may be made by resection of the seventh rib near the midaxillary line. The pericardium is adherent to the pleura but pericardotomy is possible without producing pyopneumothorax.

Tamponade of the heart is associated with pericarditis with effusion both purulent and serous and with constrictive pericarditis. Tumor of the heart while rare may cause serious compression of the heart either because of the presence of the tumor itself or because of effusion. Tamponade may be acute or chronic. It is most dramatic in acute hemopericardium especially if there is a penetrating wound into one of the cavities of the heart.

Chronic adhesive pericarditis may be of four types. There may be adhesions between the two layers of the pericardium without constriction and without fixation of the outer layer. Another type without serious cardiac disturbance is seen in pulmonary tuberculosis with adhesive pleuritis; the pleura or diaphragm is fastened to the outer layer of the pericardium. Constrictive pericarditis is chronic. The resected pericardium shows the visceral and parietal layers to be fused and indistinguishable with densely fibrous and hyalinized tissue which is poorly vascularized. Some of the cases show focal areas of calcification. Tuberculous pericarditis may be classified into three groups: (1) acute in which effusion predominates; (2) subacute in which adhesions and thickening are outstanding; and (3) chronic in which fibrosis and constriction are present.

Mediastino-pericarditis is a condition which is often confused with constrictive pericarditis. It does not often follow pericardotomy for pyopericardium. In mediastino-pericarditis, the heart, pericardium, wall of the chest and diaphragm are all bound together and during systole the heart contracts against a pull that is unyielding as far as the wall of the chest is concerned and both the wall of the heart and the diaphragm are hampered in their movements.

J. DANIEL WILLEMS, M.D.

ESOPHAGUS AND MEDIASTINUM

Ellison E. L., Tucker G. and Thigpen F. M. Esophageal Diverticula. *Surgery*, 1937 2 183

The authors give a brief historical survey of esophageal diverticula with particular reference to the one stage and two stage types of procedures and their respective attributes. They then report the cases of 10 patients who were operated upon during a twelve year period, from 1922 to 1932. Seven of these were males ranging in age from forty two to seventy years, and 3 were females ranging in age from sixty five to sixty-eight years. The chief symptoms were dysphagia, regurgitation (always more marked when lying down) and cough. The authors stress the importance of roentgenoscopic and fluoroscopic studies and esophagoscopic examination in the diagnosis of esophageal diverticula and recommend the passage of an esophagoscope under the guidance of a string which has previously been swallowed. They consider the one stage operation with the aid of the esophagoscope as the procedure of choice and utilize avertin as an anesthetic.

Among the 10 patients operated upon there was 1 death giving a mortality of 10 per cent. Post mortem examination in this case revealed atelectasis of the lower lobe of the left lung, lobar pneumonia of the right upper lobe and bronchial pneumonia of the right lower lobe. Mediastinitis did not occur in any of the patients. Of the 9 patients who recovered 6 were followed. Two were entirely symptom free at the end of four and six months respectively. Five who have been followed for periods of from one to six years are perfectly well. One might possibly be considered as having a recurrence because of statements made by this patient in a letter although he was not seen or examined by the authors. The authors were unable to obtain any information concerning one patient.

ALTON OCHSNER, M.D.

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The roentgenological appearance of esophageal varices is the product of two variable factors: (1) the anatomical formation and (2) the actual physiological condition during the exposure of the film. Anatomically, the roentgen findings vary greatly with the stage of the disease. Three groups stand out: (1) the early stage marked by slight and diffuse venous congestion and resulting in moderate broadening of the rugae of the lower esophagus; (2) the beginning of

dilatation of the larger individual veins which emerge from the submucosa into the mucosal relief, this stage is marked by small rounded defects seen in the relief of the lower fifth of the tube, and (3) generalized enlargement of numerous veins which encroach upon the mucosa. In this period a typical vermiform shadow predominates.

Varices vary in caliber according to influences acting upon their filling. Definite variations in size and extent are produced by peristalsis, especially stripping, and by the mechanical pressure of a large bolus. In either case blood is forced into the lower vessels. In early portal congestion the blood can still pass into the abdominal veins. Later it is squeezed from upper varices into lower ones, overfilling the latter. This mechanism in the early stages makes the esophageal varices invisible and in advanced stages makes visible only a part of the whole extent. Roentgen examination, generally, does no more than affirm the clinical diagnosis in advanced stages, while in early congestion the clinical recognition often depends on roentgen findings only. It is necessary, therefore, to demonstrate the mucosal relief of the esophagus when it is unaltered by peristalsis or mechanical compression. Technically speaking, the best visualization is present during the short interval between swallowing and peristalsis.

As a part of the thoracic veins the esophageal varices fill on inspiration. For this reason it is always advisable to expose films during forced inspiration.

The retardation of the passage through the esophagus, a common finding in varicosis, varies between a few seconds and several hours in the terminal stages of the disease. It is often due only to mechanical obstruction by the varicose mass. However, there are functional disturbances which also affect the cardia and cause esophageal stasis.

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Moersch, H. J. : The Treatment of Carcinoma of the Esophagus by Means of Surgical Diathermy. *J. Thoracic Surg.*, 1937, 7, 43.

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Early diagnosis is complicated by the fact that carcinoma of the esophagus is very insidious in its onset and is usually well advanced before it produces symptoms. To add to the difficulty, the tumor is usually of a high degree of malignancy. That there is room, however, for progress in the field of diagnosis is apparent from a review of the case histories of 447 patients seen at the Mayo clinic during a four-year period. The average duration of symptoms before the patient came under observation at the clinic was seven and one-tenth months. It is therefore apparent that early diagnosis is the exception rather than the rule.

In dealing with large numbers of patients suffering from a disease such as carcinoma of the esophagus, one is bound by the laws of chance to encounter occasionally a case in which the disease is in a relatively early stage of development. The case presented by the author belongs to this group and illustrates what might be accomplished by the use of surgical diathermy.

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The etiology of the condition is unknown, but the consensus of opinion is that it is probably congenital. Eventration is rarely responsible for clinical symptoms. The diagnosis is made by fluoroscopic examination with a contrast medium in the stomach. The hemi-diaphragm on the affected side remains stationary, whereas the other half moves normally. The author reports 4 such cases seen at the Toronto General Hospital, Toronto, Canada. He discusses the differential diagnosis, but does not recommend a particular form of therapy. PAUL MERRELL, M.D.

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The surgical stabilization of the intrathoracic pressure can be produced in several different ways: (1) by maintaining the normal differences in pressure, (2) by the artificial production of adhesions between the visceral and parietal pleura (this may be done either by the use of the Mikulicz tampons as recommended by Sauerbruch, or by the pneumopexy recommended by the author. The second method is possible only if the first method is active, that is, the lung may not be collapsed), and (3) by artificially fixing the upper anterior mediastinum, either intrapleurally or extrapleurally.

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The author does not discuss the first two methods. It is well known that one can safely perform intra thoracic surgery if the mediastinum is fixed and will not swing from side to side. This led the author to investigate the possibilities of artificially stiffening this body. As this required a demonstration of the mediastinum, mediastinography was developed. From the experiences in his clinic the author recommends kymography which can be done with or without the injection of 5 c.c.m. of abrodil. The injection of this substance is valuable as the outer borders of the mediastinum may be fixed by adhesion while the inner portion is free to move. If this is the case and the adhesions are freed a catastrophe may occur.

For stiffening the mediastinum, viscol appears to be better than salt solution but it is not sufficiently viscous. In the search for a more suitable material the author came upon a substance which not only fills all requirements, but possesses qualities which make it valuable for all forms of packs. It is polyvinyl alcohol, the basis of Braun's syntophyl first described by Hermann and Haenel and related to synthetic rubber. It is absorbed by the tissues. The faculty of resorbability is also possessed by its solvent water. The pack contains 94 per cent water is of rubbery consistency at body temperature and is liquid at from 45 to 50 degrees. It can be introduced by either gravity or injection with a syringe. It hardens rapidly. It can be readily sterilized by heat. Careful investigations by Pfannenstiel have shown its entire indifference to all human secretions. By the addition of medicaments, bactericidal and other activities can be induced.

Animal experimentation showed reactionless healing of the injected area. The absorption takes place from the surface by slow phagocytosis. When polyvinyl is injected into the mediastinum of a cat with a large thoracic window, mediastinal flutter stops almost immediately. With 20 c.c.m. injected into the mediastinum a large window may be opened into the chest without fear of mediastinal flutter. This same amount will produce a stiffening of the mediastinum in the human.

In the first case described there was a traction diverticulum of the esophagus at the level of the bifurcation. The mediastinum was stiffened preoperatively which made it very easy to operate with a collapsed lung. The lung was expanded before the thorax was closed. Cure was obtained.

In the second case the mediastinum was also stiffened. Chondromyxosarcoma with involvement of the lung was found. The thoracic wall was re-

moved and the lung was partially resected. There was an open pneumothorax. The patient coughed up a bad phlegmonous pleural infection.

In view of the excellent results obtained in these two cases the author believes that the stiffening of the mediastinum should be used when it is difficult to maintain the normal differences in the intrapulmonary pressure or when an open pneumothorax may be expected in the postoperative course. He uses this method in all cases of pulmonary collapse when the kymogram reveals a mobile mediastinum or when this condition is merely suspected. After obtaining good results with this material in the mediastinum the author began to use it for pack in thoracic surgery. Animal experiments showed it to be reactionless in the pleural and extrapleural spaces. If more than one half of the thoracic space was filled with the material care was required to observe the amount of exudate. This could however be removed by paracentesis.

The physical action of the pack demanded clinical proof and the following case afforded the author the opportunity to study this. The patient presented a pyopneumothorax following rupture of a cavity into an oleothorax. He was in an apyretic condition from a bad bilateral phthisis complicated by myocarditis. After the pleura was emptied and filled with polyvinyl the diseased half of the lung could be immobilized. The cyanosis decreased and the pulse rate improved. After eleven days the patient died of myocarditis. Autopsy showed the lung to be covered by the pack which separated it from an empyema. The immediate picture after the injection was as fine as is seen following a pneumothorax performed under the most favorable circumstances.

Following this unquestionably good result the method was introduced whenever collapse therapy was indicated, especially in pulmonary tuberculosis. It was used in combination with partial thoracoplasty, apicolysis and for the purpose of making a pack in bronchiectases and an inferior intrapleural pack for collapse of the lower lobe. This shows the universal action of the pack.

After using the material for one half year, the author concludes that polyvinyl alcohol is a splendid material for a pack that it not only has the property of being slowly absorbed by the tissues, but also has a beneficial specific and non-specific effect upon tuberculous infection with apparently no ill effects. Further experiments are under way. If large packs are used, one must consider the additional compression of an exudate which may be removed by paracentesis.

WILLIAM C. BECK, M.D.

SURGERY OF THE ABDOMEN

THE TREATMENT OF ABDOMINAL INJURIES

Collective Review

KARL MEYER, M D , F A C S , and PHILIP SHAPIRO, M D , F A C S , Chicago, Illinois

THE literature contains many isolated case reports of abdominal injuries Gilbert (31), Payne (68), Hudson (39), Lee and Gallagher (45), Estes (24), and Gupta (33). Comprehensive reviews are not as common. Enderlen and Sauerbruch (23), Krabel (42), Valentine (89), and Dudley (21). In private practice the number of cases of abdominal injury is usually limited. In industrial practice this number is steadily increasing (Metz 61, Hanchett 34). In war time the pressure of work and the unfavorable circumstances under which it must be conducted, militates against thoughtful observation or improvement. It is chiefly on the service of large general hospitals in peace time that the material is adequate and the facilities for painstaking work are sufficient to encourage progress.

Instances of recovery from abdominal injuries, usually stab wounds, have been recorded since the days of Xenophon. Long ago, far-sighted surgeons recognized the facts that abdominal wounds should be opened and the viscera sutured. Oberhelman (65) quotes the advice of Jherome of Bruynswycke in 1525 to this effect. Parkes (67) quotes a prophecy of J. Marion Sims who was convinced that the mortality from operating on abdominal gunshot wounds would some day be as low as that from ovariectomy.

Before anesthesia and asepsis, surgeons in general were reluctant to accept this advice. During the Civil War, an abdominal wound was partially enlarged and some attempt at intraperitoneal hemostasis and suture was made only occasionally. The mortality was over 90 per cent. By 1900 it was decreased to 75 per cent (Farley 27). In the early years of the World War the factors of delay and poor operating conditions proved so disastrous that the operative treatment of abdominal wounds was discouraged. In the later years these factors were corrected and the mortality fell to from 50 to 60 per cent.

It is agreed in the literature that the policy of prompt laparotomy in penetrating wounds of the

abdomen is definitely an American contribution. This is ascribed to the abundance of peace-time material in America, "where it is the general custom to carry firearms, and to use them on little provocation." The tendency to violence and the disregard for human life was increased further by the World War. The number of cases of bullet wound in the Cook County Hospital was abruptly doubled after the War (Oberhelman 65). With all this material, modern surgery is still woefully short of Sims' prediction. Since 1920 the mortality statistics have remained stationary. Occasional better controlled series which have been reported encourage the conviction, however, that careful preparatory and operative work, analysis of the pertinent factors, and a wider diffusion of the knowledge so gained will substantially improve the general results.

PENETRATING INJURIES

It is now almost universally accepted that, with rare exceptions, all penetrating wounds of the abdomen should be operated upon as soon as possible. The exceptions include occasional small stab wounds of the lower chest, upper abdomen, or kidney regions (Vaughan 90), penetrating wounds in any region of longer than thirty-six hours' duration with the patient obviously improving, and shotgun wounds at a distance.

The first group of exceptions does not include bullet wounds, these must always be explored. In cases of small stab wounds involving the stomach it has been found that if the stomach is empty at the time of stabbing and is kept empty, and if the gastric laceration is no longer than 1 cm., the mortality of conservative treatment is so low, viz., 10 per cent, that operation is hardly worth the risk of the thoraco-abdominal approach which is usually required. If the stomach is full at the time of stabbing, or the laceration is longer, and these are much more frequently the conditions which obtain, prompt exploration and suture are demanded, for without operation the mortality is 88 per cent (Wangensteen 95).

Small, short stab wounds of the liver or kidney are better not operated upon if concomitant bowel

From the Cook County Hospital and the Departments of Surgery and Physiology of Northwestern University Medical School, Chicago

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In the second case the mediastinum was also stiffened. Chondromyosarcoma with involvement of the lung was found. The thoracic wall was re-

moved and the lung was partially resected. There was an open pneumothorax. The patient survived without a bad phlegmonous pleural infection.

In view of the excellent results obtained in these two cases the author believes that the stiffening of the mediastinum should be used when it is difficult to maintain the normal differences in the intrapulmonary pressure or when an open pneumothorax may be expected in the postoperative course. He uses this method in all cases of pulmonary collapse when the kymogram reveals a mobile mediastinum or when this condition is merely suspected. After obtaining good results with this material in the mediastinum the author began to use it for packs in thoracic surgery. Animal experiments showed it to be reactionless in the pleural and extrapleural spaces. If more than one half of the thoracic space was filled with the material care was required to observe the amount of exudate. This could however be removed by paracentesis.

The physical action of the pack demanded clinical proof and the following case afforded the author the opportunity to study this. The patient presented a pyopneumothorax following rupture of a cavity in an oleothorax. He was in an apyctic condition from a bad bilateral phthisis complicated by myocarditis. After the pleura was emptied and filled with polyvinyl the diseased half of the lung could be immobilized. The cyanosis decreased and the pulse rate improved. After eleven days the patient died of myocarditis. Autopsy showed the lung to be covered by the pack which separated it from an empyema. The immediate picture after the injection was as fine as is seen following a pneumothorax performed under the most favorable circumstances.

Following this unquestionably good result the method was introduced whenever collapse therapy was indicated especially in pulmonary tuberculosis. It was used in combination with partial thoracoplasty apically and for the purpose of making a pack in bronchiectases and an inferior intrapleural pack for collapse of the lower lobe. This shows the universal action of the pack.

After using the material for one half year, the author concludes that polyvinyl alcohol is a splendid material for a pack that it not only has the property of being slowly absorbed by the tissues but also has a beneficial specific and non-specific effect upon tuberculous infection with apparently no ill effects. Further experiments are under way. If large packs are used one must consider the additional compression of an exudate which may be removed by paracentesis.

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blood pressure is less than 80. In cases of similar wounds, if the systolic blood pressure is over 90, a good prognosis can be offered

Loria (49) found, in general, that among patients who had had a large hemorrhage there was a mortality of 87 per cent, while among those who had had a small hemorrhage it was only 36 per cent. The blood pressure permits a better estimate of the severity of acute hemorrhage than the erythrocyte count, and is easier to follow (An infrequent factor of error is previous hypertension) Why the patient with a low blood pressure is more likely to develop peritonitis is a matter for further study, but the fact is clear

Spark and David (82) have shown that it is not the extravasated blood acting as a foreign body which favors the peritonitis. In all hemorrhage, leucocytosis occurs (Sommer 81). It may be that in shock there is a visceral capillary paresis which interferes with the mobilization of immune bodies and allows the fecal and environmental contamination at the time of the operation to gain a fatal, infectious foothold

If after the primary treatment of shock with morphine, rest, and warmth, the blood pressure does not rise above 80, shock thereafter, for all practical surgical purposes, should be assumed to mean hemorrhage. That shock ordinarily meant hemorrhage was obvious to Parkes, forty years ago. Since then, neurogenic and toxic factors have been given surgical consideration, and only recently Blalock (9) re-awakened surgeons to the exemic factor. The practical application of these controversies is important because the pernicious practice of giving intravenoclysis to patients in "shock" has developed. Every medical student learns that the first requirement in controlling hemorrhage is to "stop the bleeder." He learns that the drop in blood pressure is one of the factors favoring the spontaneous arrest of hemorrhage. Yet only with difficulty can he be dissuaded from hurriedly starting an intravenoclysis on a patient in "shock," raising his blood pressure, starting up the hemorrhage again, and washing out whatever blood the patient still has in his vessels with salt solution. Vital tissues cannot be oxygenated with salt solution. The procedure is an indirect variation of the practice during the Crimean War, of bleeding patients who were bleeding in order to stop their hemorrhage.

Since shock is hemorrhage, the treatment for shock is blood transfusion. The quantity of blood usually given, up to 500 c cm., does not re-start bleeding partly because blood transfusion is at the same time a hemostatic maneuver. Only during the transfusion of the second 500 c cm. does

the blood pressure rise so high as occasionally to overcome this factor and re-start bleeding. Even then, if some blood be lost, it is being replaced by a greater quantity of almost equally good blood, and not by salt or glucose solutions. Acacia solutions are not recommended because of the severe degenerative changes in the liver (Studdiford 84). Hypodermoclysis might be allowed as an idle deposit of fluids which will be available when the blood pressure improves after operation, but it is not a significant maneuver. Intravenoclysis is forbidden. The main reliance is placed on blood transfusion.

The institution of the "blood bank" at the Cook County Hospital will be, it is hoped, an important factor in reducing mortality. Blood from all available donors is typed, checked by the Kahn reaction, and stored. Cross-matching takes but a few minutes. An emergency supply of blood is always available. If after one transfusion, the blood pressure rises to 90 or 100, operation is started at once. If it rises barely to 80 or less, or does not rise at all, transfusion of a second 500 c cm. of blood is started, and the operation begun. A pressure remaining at much below 80 or slowly falling demands immediate operation, but operation must be then regarded as one of despair, a measure of last resort.

General anesthesia is usually employed to secure complete relaxation and to allow rapid work. Spinal anesthesia is not used because it lowers the blood pressure. Local anesthesia may suffice for at least the early exploration of many stab wounds and of occasional bullet wounds which are tangential to the peritoneal cavity. Suspicious stab wounds may be followed under local anesthesia until it is determined how deeply they have gone and how much damage has been done. If intraperitoneal repairs are necessary, they may have to be completed under general anesthesia. Even massive eviscerations from large stab wounds can often be repaired under local anesthesia, with the possible necessity of general anesthesia for a few minutes while the viscera are being replaced.

The prognosis of stab wounds is not as bad as that of bullet wounds according to Martin (54). The average mortality from stab wounds is 26 per cent as compared with 60 per cent for bullet wounds. Even the huge eviscerations often present surprisingly little shock and uneventful recoveries (Thomas 86, Revelli 73). The bowel perforations are usually small and but little traumatized. There is no explosive spattering and "seeding" of feculent material as in bullet wounds. The repaired bowel is washed clean of street dirt and other contamination with large quan-

damage, serious internal hemorrhage, or a large flank hematoma is excluded. Even abundant hematuria does not necessarily call for surgery. Small lacerations stop bleeding spontaneously under a Scultetus binder and surgery only restarts the bleeding. Small spleen wounds are not quite as benign. Yet without signs of hemorrhage, or the development of a 'blood cake' about the spleen which can be detected by percussion and fluoroscopy, conservatism may be employed. The patient must be watched carefully, for late secondary spleen hemorrhages are dangerously common. The spleen is such a dispensable and usually easily removable organ that if doubt exists it is better to operate even for the small stab wounds.

After thirty six hours a patient not showing improvement in his condition must be explored if his condition permit. After thirty six hours a patient showing improvement usually has neither much of a bowel perforation nor much of an internal hemorrhage. He is given nothing by mouth for from four to eight days, and the bowel is kept empty by continuous suction through a nasal tube. Morphine is given abundantly at first, not only to eliminate pain but to contract the intestinal musculature. Blood transfusions correct hemorrhage and are supportive. Hypodermoclysis is given on the first day thereafter intravenous infusion is started cautiously and increased slowly to reduce the danger of re-starting hemorrhage from the unligated injured vessels. Enemas are interdicted. Tetanus antitoxin and anti gas-bacillus serum are injected and the injections are repeated in five days. The abdominal wall wounds are kept open for free drainage. Watch is kept for late abscess localization or secondary hemorrhage.

Close range shotgun wounds are almost always hopeless. Shotgun wounds sustained at a distance are better treated conservatively as outlined above (Willis 97). It is impossible to find all of the hundreds of perforations which are so tiny that they close spontaneously anyhow. The handling of the intestine to find all of the holes only spreads them more widely open and extrudes more feculent contaminant. Surgical trauma further decreases the peritoneal resistance. All points of entrance of the shot into the abdominal wall are surgically dressed with removal of what ever shot wadding or bits of clothing that can be lifted out easily. The mortality under this management viz. 35 per cent is better than that which can be obtained by operation (Willis 98).

With these rare and closely conditional exceptions all penetrating wounds are operated upon as soon as possible. It must be assumed until proved otherwise that the bowel has been per-

forated. The absence of "shock" does not speak against this assumption. The desperate urgency of these small puncture wounds cannot be overestimated. The prognosis depends among other factors directly on the time interval between the injury and operative repair. As soon as possible means as soon as the patient can be brought to the hospital and can be prepared, and as soon as his condition permits operation.

The transportation problem in municipal areas is fairly well solved but in rural areas may still be a difficult issue. Once the patient is in the hospital, no time is wasted. Rapid routine includes important points in the history, and physical examination, blood pressure, rectal temperature, blood count, urine examination, examination of the rectum for blood, and gastric aspiration. Blood is drawn for cross-matching and the operative area is shaved. All these procedures are done while the morphine atropine is taking effect and the patient in the Trendelenburg position is warmed under blankets with a heat cradle. Fluoroscopy if necessary is done on the way up to the operating room.

No patient is rushed pell mell into the operating room. Life does not hang on minutes. A little time spent in estimating the probable injury and in improving the patient's condition will more than pay for itself in the operating room and in the final results (Baumgarten 5). In the American Surgical Hospitals during the World War, the German wounded often responded better than the Allied wounded, because they were operated upon last. Under external heat rest and morphine primary shock passes. Morphine atropine not only eliminates pain but incidentally has a fortunate effect in stopping cardiovascular disturbance from visceral irritation (Maher, Crittenden and Shapiro 52). The blood pressure rises. A patient should scarcely ever be operated upon unless his systolic blood pressure is 80, and the outlook is brighter if it is 90 or 100. The prognosis depends directly on the patient's blood pressure at the time of operation almost as much as it does on the time interval before operation.

The chief problem in operating on a patient in shock is not so much that of repairing the damage and getting the patient off of the table (although that too can be a serious problem) but the question of warding off peritonitis. It is no great victory to dash a patient through a frantic laparotomy, suture the intestine and ligate vessels up and down his abdomen only to have him struggle through three days of pain and sepsis and die of peritonitis. This is the usual sequence in a wounded patient who is operated upon when his

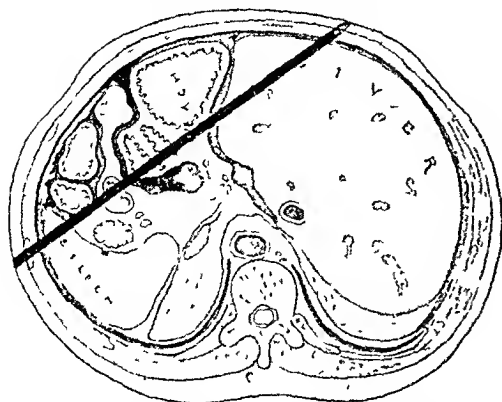
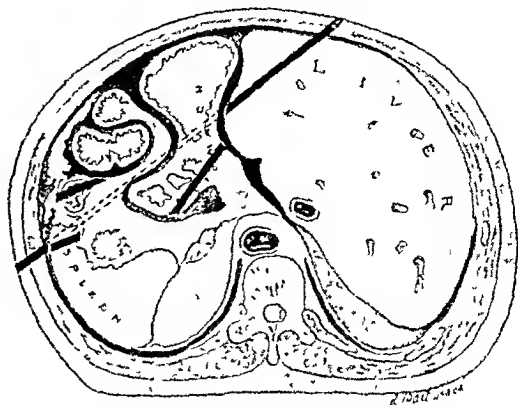


Fig. 2 Left Bullets take a straight line Cross section of body midway between xiphoid process and umbilicus Solid and hollow viscera and abdominal wall in positions they occupy as patient is standing or sitting as at time of assault Path of bullet is straight



Right Patient lying on operating or examining table Solid and hollow viscera and abdominal wall have shifted from their previous relative positions so that the bullet is now apparently erratic These broken lines can be aligned during exploration into a straight trajectory

T-shaped transverse extensions give the best access For the most rapid work, the intestine is at once eviscerated into warm wet towels, the perforations of the bowel and mesentery located and closed, and the whole mass returned If speed is not so urgent, a somewhat gentler technique is to "run the bowel" in segments, and return each as its repair is completed In Le Count's autoptic series, overlooked perforations were found in one-half of the patients who died The overlooked perforations may not have been the entire cause of death Meticulous operating to avoid overlooking a perforation may carry enough extra surgical trauma to balance the scales against careful search (Billings 7) The burden of responsibility, however, lies on the surgeon who has overlooked holes

The chief practical value of the straight-line rule is that when the repaired viscera are replaced, the bullet track can be reproduced. When every gap in the line is filled, the surgeon can rest assured that he has found and corrected every perforation He need waste no further time in re-checking Retroperitoneal bowel wounds especially are not missed if the rule is followed Perforations are closed as quickly and simply as possible (Mauro 56) A cross suture of catgut through all layers secures rapid closure and hemostasis. A Lambert or mattress suture of silk or linen is used for peritonealization Bowel-wall hemostasis is important Especially in the stomach fatal secondary hemorrhage can occur from a submucosal vessel missed by a simple serosal suture The sutures should not be pulled too tightly Fine suture material gives stronger unions than

coarse Vessel walls and bowel surfaces need only bare contact for the best healing.

Multiple adjacent perforations are managed better by resection of the involved segment and end-to-end anastomosis Cases requiring resection carry a higher mortality than those requiring only closure of the perforations The mesenteric angle is carefully closed by a single or double Monsell suture The remainder of the anastomosis, however, can be done quickly by a continuous glover or lock suture, or by interrupted simple or mattress sutures reinforced by Lambert peritonealization Any tendency to constriction can be corrected by oblique resection or by enlarging the stoma with a longitudinal incision along the anti-mesenteric border Tangential bullet "grazes" of the intestine are closed over by transverse infolding to prevent late perforation.

Mesenteric ecchymoses if small can be disregarded. They are due to rupture of tiny veins from the explosive effect of the bullet Larger ecchymoses or perforations must be opened, and the injured vessels isolated and ligated Rarely is additional bowel resection required because of vessel damage The collateral supply is abundant through the numerous arcades The mesentery can be stripped off for 3 inches of the ileum in animals and the bowel still remain viable Further away from the intestine, the marginal artery and the numerous arcades readily replace one another In the presence of mesenteric injury, if the corresponding bowel presents no color changes, nothing need be feared If viability be threatened, some pallor or cyanosis will at once be evident and will set the indication for resection

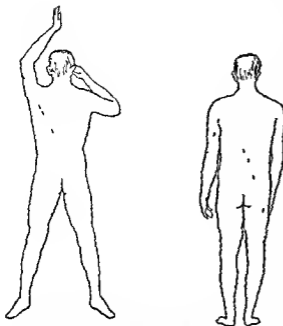


Fig. 1. Left: Course of bullet at time of wound infliction when patient was in typical prone rifle position. Right: Apparently bizarre course of bullet when patient is on examining or operating table.¹

ties of warm sterile saline solution and returned to the peritoneal cavity. The worst source of infection in some of these cases is not spilled bowel content but the bacteria carried in on the knife blade from the assailant's practice of spitting on the blade before plunging it in. Fatal peritonitis may ensue from this source alone without any bowel opening. The best medium for such infection is the abdominal wall fat which then drains into the peritoneal cavity. Even late sudden deaths may occur from rupture of such abscesses into the peritoneum. For these reasons even small penetrating stab wounds must be explored and the peritoneal opening closed tightly, without drainage. The abdominal wall tissues, however, are either drained or else left undrained or closed only loosely with interrupted sutures to insure drainage outward.

Bullet wounds are more serious and difficult. Repair is considerably facilitated, however, by a pre-operative determination of the probable course of the bullet. It is a common delusion that bullets take curved and bizarre courses through the body. This is a fantasy inherited from the days before exploration and the x-ray and fostered by insuffi-

cient analysis of the circumstances of the shooting (Figure 1).

Bullets take a straight line. If one bullet struck the patient, a straight line between the wounds of entrance and exit will mark every viscus injured unless the viscera have shifted since the shooting. With the patient lying supine on the operating table, the liver, stomach and other viscera are in somewhat different relation to the abdominal wall wounds than when he received the wound. He was then probably erect or prone. The small intestine may move considerably afterward. Nerve tubular structures, like larger arteries and to a less extent veins and the ureter, have somewhat of a capacity of slipping aside from the path of an oncoming bullet, because of the pressure alterations set up in front of rapidly moving missiles. Lungs are often perforated clean through without producing any symptoms. With correction made for factors such as these, the straight line rule can be demonstrated in almost every case (Figure 2).

If a bullet has enough force to go through skin it will not be deflected by soft parts. Ribs are fractured by bullets or stop them, but do not deflect them. Vertebral bodies frequently stop bullets, even if they are struck tangentially. If the bullet passes by at all, it is deflected only rarely, and re-starts a straight course from that point on. Another possible exception is the case in which a bullet has just managed to get through the skin and into the peritoneal cavity and then drops free in the pelvis (R. T. Vaughn '90). Isolated in 'arces of bullets falling to rest inside the intestine or working their way into large vessels and being transported widely have been reported but are too rare to disturb the rule (Oberhelman and Le Count '65; Simon '79).

If there is no wound of exit, the bullet can sometimes be found by passing the hand firmly over the skin of the opposite side of the body. The skin acts as a leather shield and can alone stop bullets which are almost spent. If the bullet still can not be found fluoroscopy should be done to locate it, and is well worth the time. A straight line between the bullet and the wound of entrance will mark out the path of damage. Multiple bullets complicate the picture but still allow of pre-operative alignment.

The incision is planned on the basis of this alignment so that the viscera involved may be reached most easily. Generous incisions are required. The more experience a surgeon has had in abdominal injuries the longer are his incisions. Transverse or oblique incisions are sometimes suitable. L-shaped incisions with L-shaped or

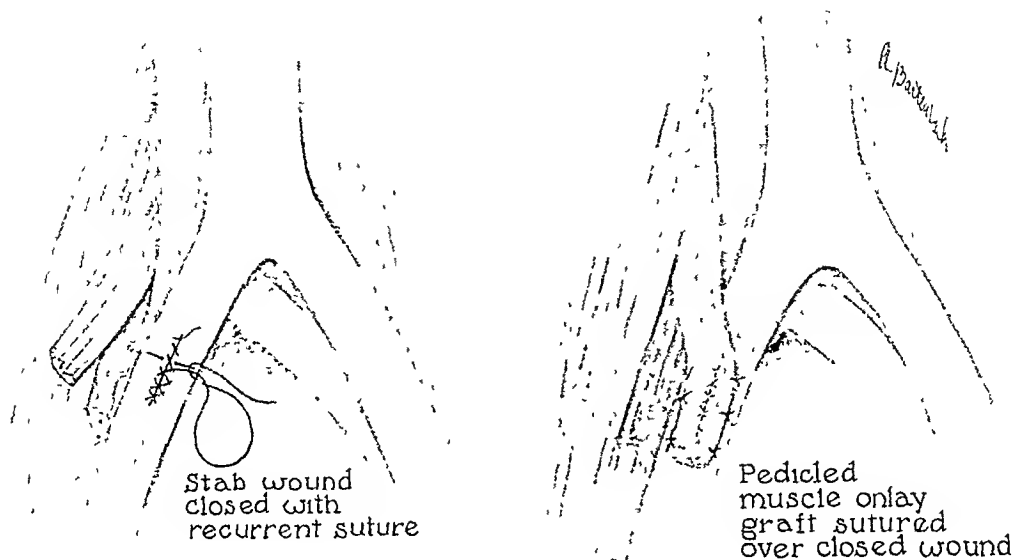


Fig 4 Left Continuous recurrent suture of fine silk in stab wound of iliac artery The vessel must be controlled during repair by proximal and distal provisional hemosta-

sis by the sling-tape, bulldog clamp, or Spivack clamp methods Right Graft from psoas muscle raised and sutured to the vessel to buttress the arterial repair

lung or heart (Mayer 57) The usual policy in penetrating wounds of the chest is conservative management except on specific complication, but if abdominal penetration is suspected, exploration is required (Just 41) The approach depends on the predominant injury In stab wounds, it is usually made through the chest Small wounds of the stomach or colon may sometimes be repaired through the tear in the diaphragm The diaphragm is then closed to prevent hernia If the abdominal injury is more extensive, an abdominal approach is added In bullet wounds, the predominant injury is likely to be abdominal and the latter approach is preferred with extension to the thorax if necessary Temporary phrenic paralysis by crushing may be used to assist diaphragmatic healing if the patient's condition justifies the procedure (Nierstrasz 64) In abdominopericardiac wounds in the epigastric notch, the pericardial sac may be drained internally into the peritoneum through the diaphragmatic opening rather than by means of an additional opening into the pleura This prevents recurrence of the tamponade, and still avoids external drainage. Either the peritoneum or the pleura can take care of the effusion much better than the pericardium.

The bullet holes in the abdominal wall, if severely traumatized, are excised Otherwise they

are dressed surgically, and the peritoneal wounds of entrance and exit are closed from the inside to prevent drainage of the abdominal wall into the peritoneal cavity The bullet is removed if it is easily accessible, otherwise it is disregarded The abdominal incision may be closed by through-and-through suture if speed is urgent, but it usually can be closed in layers Since wound contamination and infection are common, interrupted sutures are required, and small rubber dam drains are inserted to, but not into the peritoneal cavity Wound infection is carefully watched for and promptly drained If it is not, it can be as troublesome and disastrous as primary peritonitis, or it may rupture inward and cause late secondary peritonitis and even sudden death Even if neglected wound infections are finally controlled, eviscerations are more frequent and postoperative hernias from loss of fascial structures by suppuration are common (Du Bourquet 20, Jenkins 40)

The question of managing intra-abdominal soiling is a major problem since peritonitis causes 34 per cent of all the deaths Controversies attend every procedure suggested, but general tendencies are crystallizing (Ghose 30) It is known that gastric spillage carries the smallest threat of peritonitis Duodenal spillage is fairly benign unless the retroperitoneal spaces are implicated Urine



Fig. 3 Methods of controlling extensive and moderately large liver wounds. The tampon is a method of extremis. The free muscle grafts cushion the suture and furnish thrombokinase for hemostasis; a third piece of muscle may be inserted in the wound cleft. Small wounds may be sutured simply or disregarded.

Bullet wounds of the liver usually shatter at least a portion of it and are not only immediately serious but may lead to biliary peritonitis, liver necrosis and abscesses, portal vein thrombosis, and pulmonary emboli (McGowan 58). Small to moderate sized wounds are closed best with mattress sutures of catgut threaded through pieces of muscle excised from the abdominal wall. The muscle grafts cushion the sutures and prevent their tearing out and furnish abundant thrombokinase to promote hemostasis. Both surfaces of the liver must be repaired. In the presence of high wounds under the dome of the diaphragm, difficult to approach, it has been suggested that the liver be sutured to the diaphragm. In large wounds of the liver, or in wounds difficult of access or when the patient is in poor condition the liver wound is packed with gauze tampons which act secondarily as drains. A Scultetus binder compresses the liver firmly against the pack and stops the hemorrhage (Meyer 6) (Figure 3).

Spleen wounds of any but trifling character are most safely treated by splenectomy. Abscess, necrosis, and secondary hemorrhage are too dangerous to permit conservative management. Wounds of the pancreas are sutured if possible or tamponed but are always drained to limit pancreatic juice necrosis.

If the urinary bladder is perforated the holes are closed by a catgut suture in two layers. Non-absorbable suture is not used because of its tendency to migrate into the lumen and act as a nucleus for stone formation (Mathews 55). The bladder must be kept empty for six or seven days by an indwelling catheter. If urethral strictures make catheterization difficult suprapubic drainage is employed. A cigarette drain is also in-

serted into the space of Retzius, since it has usually been opened by the entrance or exit of the bullet. The ureter is rarely damaged but can be repaired or a ureteral catheter, or be imbedded into the colon. Kidney perforations are not uncommon. They can usually be handled conservatively unless the kidney is too badly shattered or unless the renal pelvis or vessels are irreparably damaged. Kidney suture is best accomplished by the free muscle transplant method. If the patient is in poor condition from concomitant injuries, secondary hemorrhage cannot be risked by indulging in plastic operations, and nephrectomy is safer (Herrmann 35).

Large vessel wounds usually prove fatal before admission of the patient to the hospital but occasionally lend themselves to surgery. The prognosis is poor also because internal hemorrhage has usually been severe and the patients succumb to peritonitis even when contamination has been slight. The extravasated blood is rarely used for re-infusion because of contamination. The larger veins and medium sized arteries can safely be ligated doubly and divided. The technique of vessel repair is not difficult provided the vessel is temporarily occluded by provisional compression above and below the wound. Continuous fine silk in a fine non-cutting needle closes the defect which can be further reinforced by a pedicled muscle graft (McNally and Shapiro 59) (Figure 4).

Perineal impalings, criminal abortions or pneumatic ruptures of the sigmoid in industry may also be responsible for intra-abdominal injuries (Lejar 46). Bullet wounds of the thigh may be directed toward and into the peritoneal cavity. The same principles apply, except that presacral cellulitis and perineal or gluteal abscesses and fistulas may result.

Wounds of the thorax may give a pseudoperitoneal reaction but if the abdomen is actually penetrated the mortality is higher than that of thoracic or abdominal wounds alone ranging from 76 to 92 per cent (Wilson 99, Simon 80). Operative repair of a shattered lung or liver is often impossible. Shock from severe abdominal injury increases the reduction in vital capacity caused by the chest wound. Therefore, a positive pressure apparatus no matter how simple should always be available when operation is done in cases of this type.

Half of the ribs cover the abdomen. In penetrating wounds below the fifth rib and even in higher wounds which are directed downward, abdominal injury must be considered. Similarly a stab wound of the epigastric notch may perforate the stomach and diaphragm and end in the

is watched for, but requires drainage only after definite pointing abdominally or rectally. Ileus usually yields to conservative treatment. In all cases tenacity is essential. Many an apparently hopeless situation has been saved by watchfulness and by persistent, intense after-care.

The final prognosis rests on many factors but chiefly on the amount of hemorrhage, the time elapsing before operation, the condition of the patient at the time of operation, the severity and multiplicity of the viscera damaged, the surgical skill applied, and the after-care (McQuire, 60). If patients are operated upon within six hours the mortality is 37 per cent, if between six and twelve hours it is 64 per cent, if between twelve and sixteen hours it is 84 per cent, and operation after this time saves only a few lives (Counsellor 14). Speed is important, yet if enough time has been taken for proper pre-operative diagnostic alignment and preparation, the average mortality has dropped in special series from 63 to 30 per cent.

The caliber, velocity, and jacketing of the bullet are important. Number 22's are relatively benign, number 38's and 45's have a terrific traumatizing and explosive effect so that resections are often required and recovery is rare (Loria 50). Occasionally a perforating abdominal wound may strike no viscus or large vessels. In these cases the patients usually recover, but there is still some danger from infection carried in by the missile. The average number of bowel perforations found is 5.7. If a single viscus has been struck the mortality is 34 per cent. If this single viscus is solid, the mortality is 13 per cent, and if hollow 42 per cent. Gastric, jejunal, or urinary-bladder perforations alone are relatively not serious, but the severity varies according to whether the viscera are empty or full at the time of shooting. Ileal perforations have a mortality of 48.7 per cent. Perforations of the colon have a mortality of 85 per cent, and give the greatest concern. Unfortunately, quite often more than one viscus is damaged. The same relations hold, but when two or more viscera have been struck, or when two or more missiles have penetrated, the mortality averages 80.7 per cent (Oberhelman and Le Count 65).

Rapid and skillful operating is essential. The patients who recover are usually those who required less than one hour of surgery, while those who die are those who required more than one hour. This is partly due to the more extensive injuries in the latter group. That skill and experience are also factors is indicated by Le Count's statistics at the Cook County Hospital. The mortality of the operations performed by the 2 surgical wardens who have had an abundant ex-

perience in the field was 57.6 per cent, while that of a comparable number of operations performed by 35 other surgeons combined was 69 per cent.

There will always be some irreducible minimum of mortality because of overwhelming trauma, previous general or local disease, and severe coincidental injuries. Yet series with a 30 per cent mortality have been reported (Prey 71). It is not too much to hope that with prompt action, collected judgment of risk, careful preparation, facile operating, and painstaking after-care, the mortality of penetrating wounds will some day be dropped to this level.

CLOSED WOUNDS

Diagnosis is the chief problem in closed wounds of the abdomen, as speed balanced by proper preparation is the chief problem in penetrating wounds. The surgery of closed wounds has been named aptly, "The Management of Abdominal Mysteries" (Allman 2). Although the implication is a trifle exaggerated, it expresses the quandary of the attending surgeon, the dilemma of operative indication, the frequency of unanswered problems, the bizarre findings, and late disasters (Malone 53, Thomson 87, Scholl 76). There is a note of uncertainty and impatience in the numerous reports of pseudoperitoneal syndromes forcing unnecessary and dangerous operations, of acutely serious and completely overlooked hidden lesions not operated upon, of delayed bowel necroses and rupture, of fatal secondary hemorrhages, abscesses, and cysts, and of disabling sequelæ including bowel stenoses, ulcers, adhesions, and hernias (Fairchild 26, Reid 72, Dean 18, Averbuck 3, Schorre 77).

Laparotomy cannot be undertaken lightly when so often there is so little which needs to be, or can be repaired (Robertson 74). The surgeon must answer with accomplishment for the superimposed risks of postoperative infections and hernias, pulmonary complications, surgical trauma, re-awakened hemorrhage, anesthetic insult, and the dangers from previous debilitating disease. Procrastination because of faulty diagnosis can, however, be even more disastrous.

"Peritonism" or "traumatic peritonitis" is a frequent syndrome (Ehason 22, Oppenheimer 66). There are sudden board-like rigidity of the abdomen, diffuse tenderness, and absence of peristaltic sounds. These are combined with the rapid pulse, labored respiration, pallor, anxiety, and the low blood pressure of primary shock. The clinical picture would be considered typical of severe visceral damage and internal hemorrhage. Yet all these findings can be produced either by blunt shock to the celiac plexus with no visceral damage

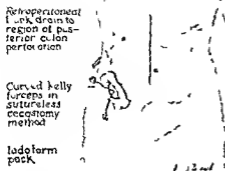


Fig. 3. Principal drainage methods used. Penrose drain to retroperitoneal tissues. Cecostomy to secure low intestinal decompression and intraluminal drainage. Incision is drained to, but not into the peritoneum.

spillage if caught early is benign. The further down the small intestine perforations are found the more serious is the soiling. The danger of peritonitis from injury of the small intestine, however, is much less than that from the colon. Bullets which enter the colon from front to back may splatter feces into the retroperitoneal tissues. It is even worse when bullets enter from the back and splatter contamination into the general peritoneal cavity. Worst of all with regard to the danger of peritonitis is the side to side bullet wound.

In closing colon wounds retroperitoneal tissues are often exposed. Drains are inserted through the flank whenever these tissues are exposed because they cannot take care of infection as well as the peritoneum. These drains are removed in stages after four days. The peritoneal cavity is not lavaged since this only spreads contaminant and is not traumatized by chemical antiseptics (Gay 28). The general peritoneum is not drained because a drain does not supply whatever ability it may lack to take care of itself (Borchard and Schmieden 10). Drains are promptly walled off anyhow. They aggravate the spread of infection encourage the formation of adhesions prolong healing predispose to hernia and increase chances of formation of fecal fistulas (Binkley and Cole 8). Only abdominal wall tissues are drained.

When the peritonitis danger is greatest, i.e., in low wounds of the ileum but especially in wounds of the colon proximal ostomy is recommended to secure low intra intestinal drainage at once. This anticipates ileus and prevents tension on the bowel sutures. For low wounds of the ileum a Witzel type of ostomy is usually used. If the bullet goes through the cecum the hole itself can be used as the stoma. A spur colostomy of any proximal part of the colon to deflect the fecal current completely is sometimes required especially when rectal or sigmoidal lacerations are extensive or have not been closed securely. Usually, only a wide ventilation colostomy is all that is required. This is best accomplished by hanging a small portion of the wall of the colon out on the abdominal surface by means of two clamps. After twelve hours enough adhesion has formed to permit gradual opening of the stoma. Under twelve hours, not enough intestinal gas to necessitate opening accumulates. This clamp method is superior to the suture method of fixing the stoma because of the troublesome abscess pockets and secondary multiple fistulas which sometimes develop after the latter technique. When the ventilation colostomy preferably a cecostomy through a McBurney incision has served its purpose it either closes spontaneously or can easily be closed surgically (Turner 88) (Figure 3).

An auxiliary or an alternative to colostomy which is recommended is dilatation of the anal sphincter at the end of the operation either by stretching or by division at the posterior commissure. A large rubber tube is then sutured in. This is effective for the prevention of colon distention provided peristalses are sufficiently active to carry gas down to the rectum and provided the tube does not become plugged by fecal masses. The sphincter gradually heals and spontaneously recovers its tonus in from seven to twelve days. This procedure is not as efficient as colostomy but is simpler.

Chemical and immunological attempts to combat peritonitis have so far been disappointing (Wangensteen 95). Most recently bacillus coli bacteragen has been injected intraperitoneally in early cases and sulfanilamide preparations have been pushed in an effort to increase resistance. They have been tried on too few cases as yet to warrant comment. Tetanus antitoxin and gas-bacillus serum are given routinely.

The postoperative care of abdominal injuries demands close supervision. It follows the routine described except that intravenous infusion is given freely. Multiple blood transfusions are of great value. Localization of intra abdominal abscesses

when it is full of food, or is diseased. The colon is injured by blunt trauma only rarely (Landon 44), but even the rectum has been burst in closed trauma by sudden compression of the colon gases against a fecal plug (Butler 13, Wagner 93).

In crushing injuries of the bowel, the mucosa is damaged worse than the serosa. In bursting injuries, the serosa is damaged more than the mucosa (Davis 16). Perforation may not take place at once. Slow necrosis and secondary infection of the bowel wall lead to delayed, unexpected, and often fatal rupture. Questionable areas on the serosa in crushing injuries should therefore be inverted widely, or resected. Late stenoses, diverticula, or adhesions result from a similar, milder process of slow necrosis (Bainbridge 4). Rarely, a mesenteric hematoma gradually extends until late mesenteric thrombosis leads to gangrene (Hogg 37).

Delayed sequelæ of injuries of the liver include sequestration, abscess, thrombosis of the portal vein, and pulmonary emboli (Robin 75, Philipowicz 70, Peter 69). Pancreatic injuries do not produce true diabetes mellitus, but may result in pseudocysts (Stevenson 83). Unoperated injuries of the kidney rarely give further trouble, injuries of the spleen often do (Allen 1, Lewis 47). Internal hernias may result from small mesenteric rents or from loops of adhesions. Diaphragmatic hernias and ventral hernias from unoperated closed traumas of the abdomen are common (Hook 38, Benkovich 6, Kummer 43).

There is considerable concern in the literature about the medicolegal aspects of late traumatic peptic ulcer (Witherspoon 100, Gerendasy 29, Gray 32, Morrow 63, Magnus 51, Eusterman 25, Liniger and Molineus 48, Crohn 15). Liniger and Molineus have set forth criteria by which it may be determined that a peptic ulcer is of traumatic origin, as follows:

- 1 Proof of the absence of a gastroduodenal lesion before the accident
2. Severe trauma localized to the epigastrium.
- 3 The immediate onset of the symptoms.
- 4 A clinical course similar to that of ordinary peptic ulcer

With these varied and clouded pictures, the first diagnosis must not be assumed to close the case. Especially, the cases which are not operated upon must be resurveyed several times a day in the beginning, and twice daily after forty-eight hours. No patient should be discharged while he complains of abdominal symptoms (Susman 85). Both the surgically and the non-surgically treated cases are followed until long afterward to detect and correct the numerous possible late sequelæ

CONCLUSIONS

- 1 The policy of prompt exploration in penetrating wounds of the abdomen is established
- 2 However, no patient should be subjected to laparotomy until proper preparation has brought his blood pressure above 80, unless the operation is one of "last resort"
- 3 Secondary shock on a surgical service is equivalent to hemorrhage, and until the bleeding vessels are ligated should not be treated by intravenoclysis but by blood transfusion
- 4 Patients operated upon in shock are not only less likely to survive the operative trauma, but are almost certain to succumb to peritonitis eventually. Correction of shock increases the resistance to peritonitis
- 5 Stab wounds are not as serious as bullet wounds even when eviscerations are produced
- 6 Shot-gun wounds at close range are usually immediately fatal. Shot-gun wounds at a distance are best managed by conservative management without operation
- 7 Bullets do not take erratic courses within the abdomen but practically always follow a straight line. Following, and filling in this straight line is one of the best assurances that no perforations have been overlooked
- 8 Free muscle grafts assist in hemostasis of the liver or kidney. In massive injuries of the liver tamponade is safer, in those of the kidney nephrectomy may be required. For even moderate wounds of the spleen, splenectomy is safer because of the danger of late hemorrhage.
9. Pedicled-muscle onlay grafts assist in the repair of large vessels
10. Bowel perforations are closed with the simplest technique which will give hemostasis and peritonealization. Resections are avoided if possible, but may be required by multiple adjacent perforations or by impairment of the bowel viability
11. For colon perforations, proximal ventilation or deflection colostomy is recommended.
- 12 Perforations of the urinary bladder are closed by catgut suture to avoid secondary stones. The bladder must be kept decompressed
- 13 The general peritoneal cavity is not lavaged and is not drained. Retroperitoneal tissues if exposed are drained. The abdominal incision is drained also
- 14 Anti-gas-bacillus serum and tetanus antitoxin are given routinely
- 15 Postoperative transfusions, intravenous glucose and saline solutions, constant suction by

whatsoever or by injuries to the back or thorax with referred abdominal signs. They can all be produced by injury to the abdominal wall alone, or by retroperitoneal hemorrhages by small omental and mesenteric injuries or by small lacerations of the solid viscera. The necessity for immediate operation seems obvious, yet in an hour or so under primary shock treatment, the abdominal sounds reappear, rigidity lessens, tenderness subsides, the shock picture vanishes and no need for operation remains. About 70 per cent of all closed injuries are of such character that laparotomy is needless, or fruitless (Hinton 36).

When laparotomy is required its necessity is often not apparent, or is overlooked, and fatal delay ensues. Because of appalling experiences of this kind it is held better to open a suspected peritoneal cavity occasionally and find no lesion demanding surgical repair, than to procrastinate until hemorrhage or peritonitis are beyond surgical recall (deTarnowsky 19). About one fourth of the closed wounds involve hollow viscera, and these must always be operated upon. Large tears of the liver require suture or tamponade. Severe crushing injuries of the kidney sometimes require suture packing, or nephrectomy. Spleen injuries must usually be treated surgically. The spleen hung on a loose pedicle has an inelastic thin capsule and a pulsatious substance which does not favor spontaneous hemostasis. Even with temporary arrest of the bleeding secondary hemorrhages develop sometimes as long as one month afterward.

The decision to operate rests on the diagnosis of injury of the hollow viscera or of serious internal hemorrhage. Shock treatment is instituted. This includes external heat, morphine, rest, the Trendelenburg position, blood transfusion and subcutaneous fluids. If the pulse and blood pressure improve, abdominal signs diminish, flatus and urine are passed and fluoroscopy shows no free gas bubble, operation is withheld. Careful supervision is continued (Davis 17).

The erythrocyte count is chiefly of sequential value but an early leucocytosis denotes internal hemorrhage and helps distinguish serious cases from primary shock hysteria or malingering. The findings from gastric aspiration are inspected for blood from possible injury of the upper bowel. Rectal examination checks pelvic peritoneal irritation from blood or spilled content of the hollow viscera and blood found on the examining finger indicates injury of the lower bowel. Blood free urine excludes injury of the bladder or kidney. If urine cannot be passed catheterization may yield clear urine or reveal an empty bladder. If the

bladder be found empty, air can be inserted through the catheter (Laughan and Rudnick 91). The subsequent detection of gas under the diaphragm establishes the diagnosis of intraperitoneal rupture of the bladder and local emphysema indicates extraperitoneal rupture.

A negative finding in fluoroscopy is not entirely reliable in excluding intestinal injury. If the stomach or cecum is ruptured when it contains air a free gas bubble will appear in most cases (Laughan and Singer 91). In doubtful cases it may be added with the stomach or colon tube. Duodenal rupture may also show retroperitoneal emphysema. The jejunum and ileum however, are normally empty. It would take twelve hours for gas to accumulate from developing peritoneal ileus before enough escaped to be seen under the fluoroscope. Cases of ruptured intestine operated upon after twelve hours terminate fatally in almost 100 per cent (Sherman 78). The diagnosis must be established long before this by persistent signs of peritoneal irritation.

After shock treatment is applied the blood pressure may rise to 80 or over but abdominal rigidity, tenderness and silence persist. The white count is elevated. Distention may begin or flank dullness appear. Fluoroscopy may show a free gas bubble. Blood may be found in the gastric content, stool, or urine. Laparotomy is then required and should be done promptly. The average time from injury to operation in the patients who lived was one hour and fifty three minutes, in those who died it was two hours and fifty three minutes (Brady 12).

After treatment of shock with one or two transfusions the blood pressure may still be low but signs of a ruptured hollow viscus, peritoneal irritation or increasing internal hemorrhage persist. Laparotomy is demanded but must be regarded as a desperate risk which has to be faced. Despite an occasional unnecessary operation since careful selective diagnosis and preparation followed by prompt operation has been practiced in the management of closed wounds of the abdomen the mortality has dropped from 70 per cent to its present level of 30 per cent.

If laparotomy is performed the same principles apply as in penetrating wounds. Fifty-eight per cent of the ruptures of the small intestine occur in the first three feet of jejunum and last three feet of ileum where these loops are compressed against the vertebral column. This is therefore the first place to look (Butler 12, Wilensky 96). The ileum within an inguinal hernia is a frequent site of rupture from external closed trauma. The stomach is occasionally burst by crushing injuries, especially

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ABDOMINAL WALL AND PERITONEUM

Fallis, L S.: *Recurrent Inguinal Hernia. Ann Surg*, 1937, 106 363

The author reviews 200 operations for recurrent inguinal hernia performed at the Henry Ford Hospital during the fifteen-year period from 1920 to 1934 inclusive. There were 26 operative failures and a rate of recurrence of 13 per cent. Seventy-eight per cent of the recurrences occurred between the ages of thirty and fifty. There were 3 females in the series, a percentage of 1.5. Ten of the patients, or 5 per cent of the series, were recorded as being overweight. Ninety-two per cent of the patients in this series had occupations which entailed heavy lifting and straining, while only 8 per cent of the recurrences were in patients whose occupations were sedentary in character. Seventy-one of the patients, or 35.5 per cent of the series, gave a definite history of injury preceding the appearance of the recurrence. Seventy-seven and five-tenths per cent of the recurrences took place more than six months after the operation, and in 52 per cent of the patients there was no evidence of recurrence until more than three years had elapsed. Twenty-six and five-tenths per cent, or more than one-quarter of the patients, were operated upon within one month of the recurrence of their hernia, and 66.5 per cent, or two-thirds of the group, before a year had elapsed. The author in a previous series of 1,600 primary hernia operations, noted that 57.6 per cent of the recurrences were on the left side and only 42.4 per cent on the right side. Thirty-eight and five-tenths per cent of recurrent hernia operations were performed under spinal anesthesia. The spermatic cord was found to have been transplanted in 40 patients, or 20 per cent of the series. There was almost an equal number of direct and indirect recurrences in this series, i.e., 99 direct and 101 indirect. Of the 53 recurrences in patients originally operated upon at this hospital, there were 38, or 71.7 per cent, of this group who had direct recurrence and 15, or 28.3 per cent, of the group who had indirect recurrences, while of the 147 recurrences in patients in whom the first operation had been performed elsewhere, 61, or 41.5 per cent, had indirect recurrences. In 18 cases, or 0 per cent, there was no sac found at operation. There were 11 cases of

sliding hernia, a percentage of 5.5. The importance of the transversalis fascia is stressed.

ELLA M SALMONSEN

Fowler, S W.: *The Status of Research on the Injection Treatment of Hernia. Am J Surg*, 1937, 37 403

After a careful perusal of the literature on the subject of the injection treatment of hernia, the author notes many points that need to be studied, and warns against the unnecessary repetition of work which has been satisfactorily done previously. Future profitable studies, he believes, lie in the fields of biopsies, necropsies, and follow-up and statistical studies of sequelae and end-results.

If a hernia cannot be reduced, or if it cannot be controlled when reduced, it cannot be treated by the injection method. The presence of a fat pad in the sacs of femoral, umbilical, or epigastric hernia causes pain when a truss is applied. Such cases should not be treated until this condition has been relieved. Undescended testicle on the involved side is a contra-indication to injection. Hyperthyroidism and hemophilia are also mentioned as contra-indications. Cardiac conditions or diabetes do not contra-indicate the injection treatment of hernia, but diabetes retards repair, as do anemia, extreme age, flabby, or very spare musculature. The author states that, with the exception of sliding hernias, all of the accessible abdominal hernias, including incisional hernias, have been successfully treated.

The most frequent complication of the injection treatment is an acute inflammatory reaction due to overdosage. A few hydroceles which soon subsided have been observed. Intraperitoneal injection of the irritant is indicated by immediate cramps in the patient, and more or less shock, however, the author believes that no permanent harm can result from this accident. He states that a sterility or impotency resulting from the treatment has not been authenticated.

During such treatment the hernia must be kept continuously reduced, and the truss may have to be worn both day and night at first. The author prefers more injections of a mild growth-producing (auxetic) substance rather than a few injections of a strong irritant. He believes that the end-results obtained

- means of the nasal tube, adequate morphine and good nursing care are essential. Apparently hopeless situations may be saved by conscientious, tenacious after care.
- 16 The prognosis depends chiefly on the amount of hemorrhage, the condition of the patient at operation, the severity of the visceral damage, the time elapsing until operation, the surgical experience, and the after care.
- 17 In closed wounds of the abdomen the chief problem is diagnosis but speed and proper preparation are also important.
- 18 Concomitantism is in general the best policy because 70 per cent of the patients have pseudopertoneal syndromes or injuries which either do not require laparotomy or cannot be benefited by it.
- 19 Shock treatment is started, however and laparotomy is performed if signs of peritoneal irritation persist, internal hemorrhage does not stop, or special tests reveal probable injury of a hollow viscus. The absence of a gas bubble does not exclude the possibility of rupture of the small intestine and suspected cases are operated upon in preference to risking fatal delay.
- 20 Careful supervision is continued especially in those patients not operated upon because of the frequency of late sequelae.

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ELLA M. SALMONSEN

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by Bratrud—only 9 incomplete closures in 707 cases—
—are attainable by the injection treatment

EARL O. LATIMER, M.D.

Burdick C. G. and Coley R. L. The Injection Method of Treating Hernia. *Ann Surg* 1937, 100: 322

In order to know from first hand information the advantages, disadvantages, and end results of the injection method for the treatment of hernia the authors undertook the treatment of 66 patients by this method in the Outpatient Department of the Hospital for Ruptured and Crippled New York. Various solutions were used but the authors found nothing which would lead them to believe there was any special value in one solution over the others. The average number of injections was 21 and the average length of treatment was one hundred and forty days. The complications were few and none were serious. There were 4 deaths but the 6 were not definitely related to the injection treatment.

Because of failure of the injection treatment subsequent operation was performed on several of the authors' patients. The interval between the last injection and the operation varied but in all cases a sufficient length of time had elapsed to permit early proliferative changes to subside. In no case was there any evidence of a strong bulwark of built up scar tissue which is claimed by many to result from the injection treatment. In fact for the most part there was little evidence of any residual tissue reaction of consequence. Reports of cures should be judged by the same critical standards as are used to judge results obtained by operation. Many of the previously reported cures do not conform to these standards.

Burdick and Coley summarize the results obtained in the case they were able to trace. There were 47 known failures and 11 possible cures but of these 9 are still wearing a truss. The authors conclude that it is difficult to deliver the solution to the exact spot where it is needed to obliterate the sac and even when proliferation occurs the tissue reaction gradually absorbs or diminishes until a state is reached approximating that which existed prior to the injection. This strengthening of the defense against hernia is questionable except for the possibility of obliterating a narrow sac in an individual whose muscles and fascia are otherwise normal. The method depends upon the formation of scar tissue and it is generally accepted that scar tissue will stretch and is weaker than normal tissue. Until statistics are forthcoming to prove a higher curability of hernia by the injection method than they have been able to obtain Burdick and Coley have decided to abandon the method entirely.

EARL GANESSE, M.D.

Frassinetti P. The Surgery of Femoral Hernia (*La chirurgia dell'ernia crurale*). *Clin chir* 1901, 13: 517

Frassinetti reviews critically the various methods which have been employed in operations for femoral

hernia. He presents his own technique, which has many advantages over older methods.

By sectioning the inguinal ligament, the constriction exerted by it upon the neck of the hernial sac is promptly relieved. In this way the hernial sac may be easily engaged and extirpated. All structures should be carefully examined and identified in order to avoid one of the most serious accidents, i.e. injury to the wall of the urinary bladder.

By preparation and careful dissection of the inguinal ligament as shown in Figure 1 the deeper structures may be easily reached and manipulated. This is especially important in strangulated hernias which require especially careful manipulations and a sufficiently large operative field permitting a bowel resection in the presence of a gangrenous loop of intestine. This method offers also a better view of the operative field than can be obtained in other methods with a femoral approach. Furthermore it eliminates unnecessary and improper traction on a viscus which may as the result of circulatory embarrassment be markedly edematous and friable adherent or sufficiently devitalized to produce a septic process in the peritoneal sac into which it has been placed. The author believes that this method is also far superior to the inguinal approach.

After the hernial sac has been isolated the fatty layer enveloping it is divided and the sac is opened. Necessary precautions must always be taken to avoid accidental injury to the urinary bladder. The adjacent intestine is inspected and in cases of strangulation with gangrene or in the presence of adhesions the incision may be extended upward to insure a field large enough to permit removal of the adhesions or a bowel resection.

The intestines are then replaced and the redundant portion of the sac is resected high enough to obliterate completely any bulging of the peritoneum. The stump is replaced as shown in Figure 2 and the structures making up the inguinal ring should be carefully identified and dissected out especially posterolaterally in order to expose Cooper's ligament and the large femoral vessels. Thus during the repair work the danger of injuring the femoral vessels or of leaving behind a dead space which frequently gives rise to recurrences is greatly minimized.

The hernial orifice is now closed and the wound is repaired in layers. With a thick and slightly curved needle a bite is taken through the aponeurotic border of the internal oblique transversalis fascia and Cooper's ligament including also the anterosuperior border of the sectioned inguinal ligament. Usually three to four sutures are sufficient. After they are tied they approximate Poupart's to Cooper's ligament and effectually close the hernial orifice. By means of the left index finger the external iliac vein is retracted in order to guard it against possible injury. Figure 3 illustrates this last step of the operation.

The aponeurosis of the external oblique muscle is now lowered and the cord or round ligament is replaced.

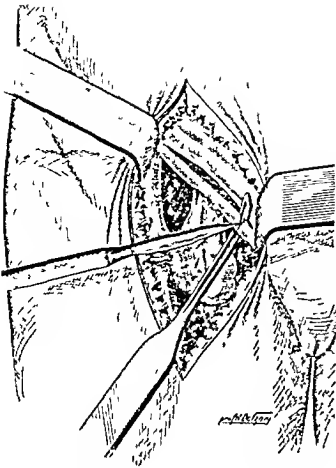


Fig 1 Resection of the inguinal ligament near its pubic insertion

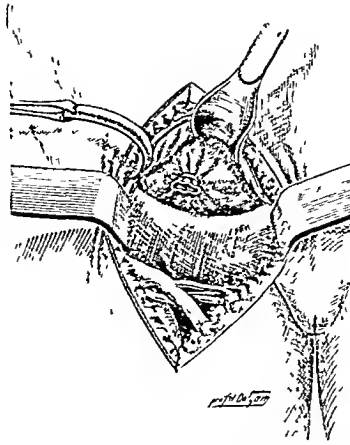


Fig 2 Ligation and section of the hernial sac and replacement of the stump into the cavity

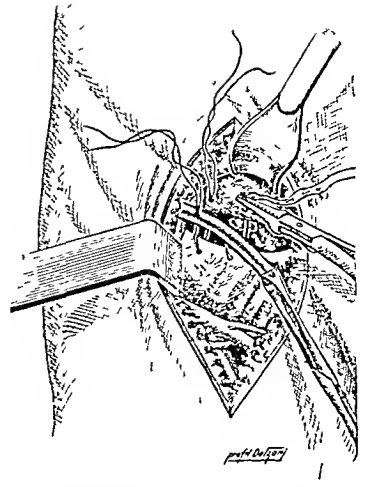


Fig 3 First step in the closure of the hernial orifice.

in its original position. The aponeurosis of the external oblique muscle is sutured to Cooper's ligament and in this fashion the overlying inguinal canal is reinforced. The operation is terminated by reconstruction of the superficial layers in the customary manner.

With this method the author operated upon 23 patients in 5 of whom the hernia was strangulated. In 1 of these patients an intestinal loop was found to be gangrenous and had to be resected. The operations were all performed with great ease and healing of the wounds occurred by first intention. There were no recurrences observed.

RICHARD E. SOMMA, M.D.

Grace, R. V., and Johnson, V. S.: Results of Herniotomy in Patients of More Than Fifty Years of Age. *Ann Surg*, 1937, 106: 347.

This analysis deals with the results of herniotomy in 1,032 patients, all of whom were more than fifty years of age. It is quite apparent that herniotomy in this group is a more serious procedure, from the risk standpoint, than the same operation in younger patients. The mortality rate of 3 per cent indicates that only by taking every precaution before, during, and after operation, can this rate be decreased.

In more than 10 per cent of these patients, operation is non-elective due to irreducibility and strangulation. In a still larger group the patient, knowing the risks and possibilities of recurrence, will decide upon surgical interference after many years of truss wearing.

The recurrence rate of 25 per cent in primary inguinal hernias and 34 per cent in recurrent inguinal hernias may lead to erroneous conclusions. The operative result is judged by the standards of anatomical (objective) result and symptomatic (sub-

jective) result. The anatomical result may, if it is true, show a high recurrence rate. More than 50 per cent of the recurrences are very small, however, and the patient is completely unaware of the fact. These small recurrences, for the most part, are without symptoms. Therefore, it is correct to state that in many of these patients with a poor anatomical result, as judged by the presence of a small recurrence, the symptomatic result is often excellent. The authors cannot too strongly emphasize the disparity in many cases between the anatomical and the symptomatic results of the operation. While the operator may note in his follow-up report many anatomical failures, the patient in many of these same cases is impressed by his complete symptomatic relief.

ELLA M. SALMONSEN

GASTRO-INTESTINAL TRACT

Lake, N. C.: Partial Gastrectomy. *Brit M J*, 1937, 2: 49.

Partial gastrectomy was done on 320 patients, 115 of whom had gastric ulcer, 56 pyloric ulcer, 71 duodenal ulcer, 27 jejunal ulcer, and 51 carcinoma. The mortality for the entire group was 10.6 per cent, or 9.5 per cent for the patients with ulcer, 14.8 per cent for marginal or anastomotic ulcers, and 14.0 per cent for carcinoma. It was interesting to note that when the cases of ulcer were subdivided into their respective groups the mortality rate was 11.1 per cent for patients with gastric ulcer, 11.4 per cent for patients with duodenal ulcer and 5.3 per cent for patients with pyloric ulcer. The considerable difference in mortality was unexpected and is explained by the author as due to the associated technical difficulties occurring in gastric and duodenal ulcers from extension into adjacent tissues.

Chest complications caused 14 of the 34 deaths, pulmonary tuberculosis 2 internal and intra peritoneal hemorrhage 4 leakage and peritonitis 6 thyrotoxicosis 1, uremia 2 influenza 1 delayed shock 1 rupture and resuture of the wound 1 intussusception of anastomosis into the jejunum 1 damage to the midcolic artery 1 and embolism 2. Therefore 5 deaths were due to activation of an intercurrent disease while 3 were secondary to conditions indirectly connected with the operation. If these are excluded there remain 26 operative deaths a mortality of 81 per cent for all cases or 7 per cent for cases of ulcer.

One hundred and ninety eight of a total of 269 patients with ulcer were followed for over two years. The results in 15 were unsatisfactory. When these 15 were further investigated it was found that 50 per cent had a secondary complication which would explain their symptoms. Re-operation on 4 of the unsatisfactory cases showed a recurrence of ulceration in 2 but the other 2 were negative. When the entire series is studied as a whole the cases with serious pathological conditions were found to give the better end results. The percentage of unsatisfactory results was larger in the cases of duodenal ulcer than in the cases of gastric ulcer but since the majority of the cases of duodenal ulcer gave satisfactory results the author explains this as due to an error in the diagnosis the symptoms really being due to other causes.

No case of pernicious anemia occurred in this series although 27 cases developed in from ten to fifteen years after operation. A mild microcytic anemia did occur in some cases. It was however, rarely severe enough to require treatment.

The postoperative study of cases of carcinoma showed that there was no relation between the size of the growth and the period of freedom from recurrence provided there was no widespread metastasis at the time of operation. In this series 2 cases of carcinoma several inches in extent have remained free of recurrence for seven and nine years respectively while another that of a young man did not recur until six years had elapsed. The average duration of life following operation was however twenty seven months. The freedom from symptoms to within a short time before death has been gratifying and makes it advisable to continue with the operation even in the presence of secondary carcinomas beyond the possibility of removal.

Surgical intervention consisted of retrocolic radical resection much like the Finsterer type of intervention. Resection for exclusion is utilized when necessary although the author has developed his technique independently of Finsterer.

High spinal anesthesia with percaine is used. It is produced by a modification of the Howard Jones method. Very small doses afford good anesthesia.

Drainage is used only when much oozing has occurred or when penetration of the pancreas or liver by the ulcer has rendered cauterization of these organs necessary.

Careful postoperative treatment is essential and no surgery of this type should be undertaken without preliminary transfusion if the hemoglobin percentage is under 60.

The operation may take from 35 to 75 minutes. The mistake of slighting any part of the operation for the purpose of saving a few minutes is always avoided. SAMUEL J. FOGELSON, M.D.

Bourde Y and Mosinger M. Enterogenous Cysts (Les kystes entérogènes). *J de chir* 1913 50 239.

The authors report a case of cyst of the terminal ileum which occurred in a child ten years old who was admitted because of violent abdominal pain of three days duration. There was moderate fever 37.8° C. A rounded movable mass was felt in the lower right portion of the abdomen. The pre-operative diagnosis of possible appendicitis was made. At operation a normal appendix was removed. A thin spherical cyst of the size of a walnut was found in the terminal ileum, almost completely obliterating the lumen. Enucleation of the cyst was impossible without opening of the intestine as the intestinal wall itself was continuous with one side of the wall of the cyst. Removal of the cyst left a defect in the intestine the size of a ten franc piece which was closed transversely by suture. This so occluded the lumen that an entero-enterostomy was done between the ileum and the ascending colon around this obstruction. Convalescence was uneventful and the patient was discharged on the twenty seventh day. Examination of the cyst showed that the lining consisted of a cylindrical epithelium with occasional formations of a gland like structure similar to the glands of Lieberkuhn. The epithelium varied from high columnar through cuboidal to flattened cells resembling endothelium. There was a thin poorly developed stroma no muscularis mucosa and no smooth muscle. The outer free border of the cyst was covered by visceral peritoneum so that the cyst was of the subserous type.

Intestinal or enterogenous cysts are usually classified as submucous intramucosal, subserous and para intestinal. The subserous variety is the most frequent. Usually this type is along the antimesenteric border but if it is near the mesentery it may extend between the leaves of the mesentery and it may be difficult to remove it without disturbing the blood supply to the bowel. The ileocecal region usually on the small bowel side is the most frequent location. Usually the cysts do not communicate with the lumen of the intestine.

The authors recommend the following classification:

1. Extra intestinal cysts
 - a. Cysts of the mesentery
 - b. Retroperitoneal cysts
 - c. Para intestinal cysts

2. Intra intestinal cysts in which the cyst is in the wall of the intestine.

The usual size of enterogenous cysts is from 5 to 6 cm in diameter the largest described was 10 cm.

the smallest was 1.7 by 0.8 cm. They are usually more or less spherical, although elongated, sausage-shaped cysts have been reported. The contents vary from clear, colorless, or yellowish fluid, to turbid, milky, viscid fluid. The wall of such cysts varies from a completely developed intestinal wall with all layers represented, to a thin structure of flattened epithelium. As a rule only epithelium and stroma are present with no submucosa, muscularis mucosae, or muscle layer. It is generally accepted that such cysts arise from embryological intestinal diverticula rather than from Meckel's diverticulum, as some have suggested. The cysts are usually observed in children and young adults under twenty years of age. Seventy-five per cent of the reported cases have occurred in females.

Enterogenous cysts usually cause no clinical sign unless a complication, such as obstruction, intussusception, volvulus, torsion, or infection occurs. In rare instances a neoplasm has been found in such a cyst. The clinical signs are therefore dependent to some extent on the nature of the complications which are present. A spherical or elongated abdominal mass may often be felt. A correct pre-operative diagnosis is practically impossible.

Treatment depends somewhat on the situation and variety of the cyst. The extra-intestinal cysts can usually be enucleated, unless they lie in the mesentery in such a position that their removal would interfere with the blood vessels to the intestine and necessitate resection of the cyst, mesentery, and a segment of the bowel. In rare instances, marsupialization may be necessary, but it is not recommended. In the parieto-intestinal variety resection should be attempted, as a cleavage plane can often be found. If no cleavage plane is found, resection of the cyst and bowel with anastomosis, or a procedure such as the authors used, may be necessary. In the reported cases excision and enucleation have given better results than intestinal resection.

M. M. ZINNINGER, M.D.

Fiske, F. A : Intussusception Due to Intestinal Tumors. *Ann Surg*, 1937, 106, 221

The author divides intussusception into two groups: primary and secondary. The primary group has an acute onset, occurs in the ileocecal region chiefly in infancy, and once it has been reduced, rarely recurs. In this group gross causative pathology is seldom found. The secondary group usually has a chronic or recurrent onset, occurs in adults and older children, and tends to recur if the causative pathology is not removed.

Intestinal tumors, either benign or malignant, intestinal ulcers due to typhoid, dysentery, tuberculosis, and Meckel's diverticula are the most common underlying pathological lesions. Intussusception frequently calls attention to a small intestinal tumor which is more commonly benign than malignant. Of the benign tumors, adenomas occur most frequently, though many cases of lipoma have been reported. Sarcoma of the intestinal tract

is a rare lesion, and when it occurs is most often found in the small bowel, particularly the ileum. Melanomas of the ileum have been reported, but not many. Carcinoma of the small bowel is a rare condition which frequently leads to intussusception.

Four cases of intussusception due to adenomas of the jejunum, lipomas of the cecum and ascending colon, reticulum-cell sarcoma of the ileum, and melanoma of the ileum, respectively, are reported. In one of these, three operations were required for a cure.

THOMAS C. DOUGLASS, M.D.

Spriggs, Sir E. : The Incidence and Treatment of Diseases of the Colon. *Proc. Roy Soc Med*, Lond., 1937, 30, 1211.

The author presents some observations on the diagnosis and treatment of colonic disease, made during the study of 1,574 cases of diverticulosis, colitis, dysentery and carcinoma, excluding the rectum.

The value of sigmoidoscopy and x-ray examination is stressed. Ptosis of the colon is said not to be related to constipation, but the real disorder is the general loss of nervous and physical tone. In 10 per cent of the patients the complaint of constipation was not justified. Of 1,000 patients in whom a delay was demonstrated, one-half of the colon was involved, in one-third of these patients, the sigmoid and rectum were involved, and in 11 per cent, the rectum only. Nearly 25 per cent of the patients were unaware that they were constipated. Failure of defecation is not usually due to weakness or paralysis of the bowel muscle, but to undue drying and hardening of the feces and the absence of normal stimulus, or to irritation or pain of some local lesion. Treatment should be directed toward the restoration of normal conditions. The diagnosis of intestinal auto-intoxication is to be regarded with suspicion, as the true condition is usually found to be some organic disease.

An incidence of redundancy of the sigmoid, amounting to 3 per cent, was observed. It is suggested that the deficient shortening on evacuation during the years of constipation may tend to cause elongations of the bowel.

Mucomembranous colitis has become less common recently, and this may be due to the widespread teaching of the harm of daily purgation, and the beneficial effects of better balanced diets. In ulcerative colitis, most of the bacteriological methods of treatment have proved disappointing.

A prediverticular state has been observed in 132 of 564 consecutive cases of diverticulosis. This appears to be due to local spasm of groups of muscular fibers. Observations suggest that there is some preceding process, probably inflammatory, which determines the site at which pouches will develop. Diverticula may remain quiescent for years, or until the end of life, but occasionally the necks become inflamed and inflammation spreads to the bowel wall. Pain, bowel irregularity, and backache may result. Operative intervention is not very often nec-

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The usual size of enterogenous cysts is from 5 to 8 cm in diameter the largest described was 10 cm.

Patients reach the surgeon in all stages of obstruction, with severe anemia, and even with full blown general peritonitis from perforation. Each patient presents an individual problem as to operability. Patients with acute obstruction should have an early preliminary drainage of the bowel by cecostomy or colostomy for lesions distal to the hepatic flexure, and by ileotransverse colostomy if the growth is in the cecum or ascending colon. Cecostomy usually suffices in cases of acute obstruction from any lesion beyond the hepatic flexure, and is useful as a first stage in later resection of the large bowel. It also makes a valuable safety valve proximal to the suture line after the resection.

Many surgeons prefer colostomy proximal to the obstruction in the left bowel. This may complicate future procedures. Depleted patients should be brought into a more normal state of physiological balance prior to resection. The administration of water, chlorides, dextrose, and blood are essential. The vitamins, and especially cevitic acid, may promote wound healing. The author favors the two-stage operation. He believes that part of the benefit derived from any two-stage procedure on the large bowel may come from the added resistance that the peritoneal cavity attains after the less radical preliminary stage. The smooth convalescence of the average patient who has had a preliminary drainage or short circuit from seven to fourteen days previous to resection of the large bowel, as compared to the frequent stormy postoperative course following the same operation done in one stage, has been observed by every surgeon of wide experience in this field. Gross contamination should be avoided during the operation. The peritoneal cavity will withstand a considerable amount of contamination but not gross soiling with spilled fecal material. A leaking suture line will almost invariably result in fatal peritonitis unless the leak is of slow development. In such instances, an abscess may form which, when drained, ends in a fecal fistula.

Immediately after resection a blood transfusion should be given routinely. Special nursing will prove a good investment for the first twenty-four hours after operation, and pulmonary complications may often be avoided. A liberal use of morphine is desirable as it diminishes the amount of bowel distention and maintains a slow, regular peristalsis. Fluids are best given by infusions of dextrose and chloride solutions into the veins. An inlying Levine tube will eliminate nausea and serve to keep the stomach empty. Proctoclysis is recommended with saline solution. The diet during early convalescence should consist of non-gas-forming foods.

Peritonitis accounted for 30 per cent of all the deaths following resection of the large bowel. These deaths represented 6 per cent of the 400 one-stage operations and 3.5 per cent of the 253 two-stage operations. The majority of cases of peritonitis occurred in patients upon whom an open anastomosis was used. Pulmonary complications rank next as the cause of death.

In conclusion, the author states that carcinoma of the right colon is a favorable lesion for cure. It is technically easily removed. The mortality, however, is higher than that resulting from resections for cancer elsewhere in the large bowel. The lack of obstruction in cases of cancer of the right colon so often eliminates the necessity of preliminary drainage that one is tempted to subject the patient to a one-stage operation. The author recommends a preliminary ileotransverse colostomy through a left abdominal incision, either a lateral or an end-to-side anastomosis, followed in from ten to fourteen days by a resection of the excluded bowel through a right abdominal incision. The aseptic anastomosis of the Parker-Kerr type gave a lower mortality for all intestinal surgery than any of the other methods employed.

JOHN W. NUZUM, M.D.

Bennett-Jones, M. J.: Primary Solitary Diverticulitis of the Cecum. *Brit J Surg*, 1937, 25, 66.

To 17 previously recorded cases of primary solitary diverticulitis of the cecum, which the author found in the accessible literature, he adds 3 cases that have recently come to the attention of surgeons associated with the Liverpool Royal Infirmary.

The author believes that symptoms occurring as a result of right-sided diverticula are very rare. He could find only 17 cases of this disease in the literature, and 2 additional cases of cecal diverticula not inflamed. He is also of the opinion that a few cases of "appendix abscess" which had been operated on later, when a normal appendix was found, were cases of perforated diverticulitis of the cecum.

He discusses the etiology, pathology, clinical features, differential diagnosis, treatment, and prognosis, and summarizes his paper as follows.

The occurrence of 3 cases of this disease in Liverpool within three months shows that it is more common than the literature suggests.

There is evidence that a few of these diverticula with a complete muscular coat may be congenital, but the majority are probably acquired. Tuberculosis, either healed or active, may be the cause of a few of the acquired cases.

It is a disease with both a medical and surgical mortality. It is of great interest to surgeons because it may be found when operation is performed for the most common surgical emergency. It is likely to be overlooked, and when it is found its true nature is not obvious. The operator will usually be dubious about the correct surgical procedure and is very likely to perform an unnecessarily radical operation.

EMIL C. ROBITSHEK, M.D.

Donati, G. S.: Contributions on the Recognition of Intercurrent Morbid Factors Between the Appendix and the Urinary Tract (Contributo alla conoscenza dei rapporti morbosì intercorrenti fra appendice e vie urinarie). *Ann Ital di chir*, 1937, 16, 527.

The author gives a short review of the associated anatomy and physiopathology of the appendix and

esary because medical measures frequently result in a remission

The average age of 64 patients with carcinoma of the colon was sixty two years. The sex incidence was 3 men to 1 woman. According to the mode of onset distribution was made as follows:

- 1 Bowel disturbance 36 cases
- 2 Pain 17 cases
- 3 Discomfort in upper abdomen or nausea, 11 cases
- 4 Blood in the stool 11 cases

Diverticulitis and carcinoma were found together in 6 patients. The tumor was excised in 13 patients, and the operation was successful in 8, 2 of whom were living ten years later. JOHN A. GRUB, M.D.

Haberer H. von. Experiences with One Stage Resection of the Colon and Improvement of the Technik (Erfahrungen mit der einseitigen Dickdarmresektion und Verbesserung ihrer Technik). *Wien klin Wchschr* 1937 1 825

According to von Niklicz and Schloffer the two stage resection of the colon was preferred formerly because of its better results. At the Fiftieth Surgical Congress Nordmann reported that there was no essential difference in the mortality statistics of the one stage and the several stage resections. The author always favored the one stage method. It was unusual to find that a few patients on whom he operated with this method died not from insufficiency of the suture and peritonitis as is usual but from an atony of the intestines. Hering was able to show in animal experiments that electrically produced peristaltic waves do not at first pass beyond the intestinal suture with the end to end intestinal suture. From this it is evident that primary resection should not be done in the presence of severe stasis and acute intestinal obstruction. Reichel who formerly was an enthusiastic supporter of the one stage resection stated later that only a minority of the cases are suitable for it.

The author then mentions the objections to a several stage resection: (1) the double operation; (2) patients sometimes feel so well with the artificial anus that they believe the second operation is no longer necessary; (3) a tumor still operable at the time of the first operation becomes inoperable at the time of the second operation; and (4) cases with extensive glands in the mesentery with a too short and rigid mesocolon or very large tumors adherent to other organs do not permit proper exposure so that one is compelled to do a one stage operation if one does not wish to abandon the operation because of inoperability.

In order to avoid the atony of the intestines the author establishes an orally placed intestinal fistula in cases of left sided tumors of the colon or when he cannot do an end to end suture he sews in the oral stump. With tumors of the ascending colon he establishes a fistula in the small intestine. With the fistula in the colon he also establishes a Witzel type of fistula which later closes spontaneously. In order

to avoid the second operation for the artificial anus he closes the oral end blindly at the site where he would have to establish the anus and sews it into the region of the abdominal wound, so that when necessary he can open it with the cautery. In the cases in which he did not need to open it he found that the gut retracted and the wound healed spontaneously. In some cases he closed the lumen of the gut over a thick catheter in the manner of the Witzel or the Kader fistula. The relief fistula safeguarded the patient from intestinal atony. The catheter was removed from the seventh to the twelfth day, and the fistula closed spontaneously.

The author then discusses whether primary resection should be avoided from the start in acute intestinal obstruction. If the circulation is in good he is not deterred from resection in carefully selected cases. In 16 of such cases insufficiency of the suture never occurred but a relief fistula always had to be established. Of 172 patients with one stage resection of the colon without a relief fistula 45 (25 per cent) died, mostly from peritonitis as a result of insufficiency of the suture or intestinal atony. Of 100 patients with relief fistulas, 22 (20 per cent) died but only 9 (8 per cent) succumbed directly from the results of the operation. In these insufficiency of the suture occurred three times, lymphogenic peritonitis once, gas phlegmon of the abdominal walls four times and twice occurring total prolapse of the gas phlegmons originated from degenerated cancers. Since the time of this experience the author operates only with the electric knife.

(FRANZ) LOUIS NEUWEIT, M.D.

Allen A. W. Right Colectomy for Malignant Disease. A Discussion of the Mortality Associated with Various Operative Procedures. *J Am Med Ass* 1937 109 923

The author bases his discussion on the results obtained at the Massachusetts General Hospital, Boston during the period from 1925 to 1936 inclusive in a series of 653 patients who were operated upon for carcinoma of the large bowel. Right colectomy is technically an easy procedure. The slow development of cancer in the right colon with its tendency to remain localized makes that location a particularly favorable site for cure. In spite of the facts however statistics show that the operative mortality is slightly higher for right colectomy than it is for surgical removal of cancer in the left large bowel. In cancer of the right colon, obstruction develops less frequently. The necessity for preliminary drainage is less frequent and the simplicity of resection aids in the temptation to subject these patients to a radical one stage operation. One group of surgeons is of the opinion that a one stage operation should be carried out in the majority of cases; another group believes that some form of a two-stage procedure should always be employed. Regardless of details certain definite general principles dealing with cancer of the large bowel are now generally accepted.

peritonitis had been ill for an equal period. Although the incidence of perforation increased in direct proportion to the length of the illness, it should be noted that an appreciable number of persons without perforation, 20 per cent, stated that the illness had persisted over forty-eight hours and 5.4 per cent of the group noted symptoms for one hundred and forty-five hours or more.

The location of the pain at the onset of illness was generalized in 43.2 per cent of the cases in Group I but had begun in or had been projected to the right lower abdominal quadrant in 80.6 per cent of these cases. Of the remaining patients without perforation, 6.9 per cent had had generalized abdominal pain, in 3.4 per cent the pain had persisted across the lower part of the abdomen, and in 3.1 per cent the pain was referred to the epigastrium without projection. The fact should be stressed also that the behavior of pain in acute appendicitis is not consistent, and that the possibility of the disease should be considered in any case in which there is abdominal distress.

Nausea and vomiting were present in nearly equal proportions in all groups, although these symptoms were noted somewhat more frequently in patients with generalized peritonitis.

The value of the leucocyte count in the diagnosis of acute appendicitis has been overemphasized, and the accuracy of any present method of counting has been seriously challenged. However, if full reliance is not placed on this count as a positive means of differential diagnosis and its limitations are realized, it has some value as an added bit of information in the clinical picture.

In practically all patients with simple acute appendicitis, 96.7 per cent, tenderness was elicited in the right lower abdominal quadrant, although in 2 cases tenderness was generalized and in 4 cases there was no tenderness on palpation.

Rigidity was absent in a surprisingly large number of cases in the first two groups, but was present in the right lower abdominal quadrant in practically all of the other cases in these groups.

Perhaps the most significant finding in this study was the relatively high mortality when patients with diffuse peritonitis were treated primarily by the accepted conservative methods. It should also be noted, however, that 7 patients were not operated on because their general condition was never such that exploration seemed justifiable. Among those patients who were operated on eventually there was a mortality of only 10 per cent.

This report has been based on a study of the results of operative and non-operative treatment in 674 consecutive cases in which a positive diagnosis of appendicitis with or without diffuse peritonitis or abscess was verified by pathological examination at some stage in the disease. Clinical and laboratory data together with end results have been tabulated. Emphasis has been laid on the importance of treating each patient as an individual problem and of refraining from following any dogmatic plan of procedure, particularly when perforation has occurred and there

has been diffuse soiling of the peritoneal surfaces without evidence of localization.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Liedberg, N : *Clinical Studies on Acute Cholecystitis* (Klinische Studien ueber die akute Cholecystitis) *Acta chirurg Scand*, 1937, 79 Supp 47

A study of the literature seems to indicate that there is an increasing tendency to operate upon cases of acute cholecystitis during the early stages of the disease. It is believed that the eradication of the diseased organ hastens recovery with a lessening of co-incident changes in essential organs, notably the liver. Moreover, there is a belief that the mortality is no higher, and is perhaps lower, than when conservative treatment is employed. One of the chief aims is the prevention of serious complications, such as perforation of the gall bladder and spreading peritonitis. A summary of the evidence in the literature suggests the question whether cases of acute cholecystitis should be operated upon in the course of the disease while the symptoms are in the ascent or when the symptoms are on the decline or have abated.

A study of the material in the Lund Surgical Clinic during the ten-year period from 1924 to 1933 shows that 556 patients with acute cholecystitis were under observation. Of these, 291 were operated upon at the time of their first admittance to the clinic and 17 on readmission, which make a total of 308 operated upon during the acute or subacute stage. In the group of patients in whom a cholecystectomy was performed, the mortality was 6.8 per cent. Among 20, all in poor condition, in whom cholecystectomy was done, the mortality was 50 per cent. However, in a compilation of the statistics it was noted that during the five-year period from 1924 to 1928 more operations were performed in the acute stage than during the second five-year period.

A study of the blood-sedimentation rate in acute cholecystitis seems to offer considerable aid since there appears to be a close relationship between the clinicopathological picture and the blood-sedimentation rate. In two-thirds of the cases a rise in the rate was found as early as the first day. During the time the disease is increasing in severity, there is, in most instances, a rise in the sedimentation curve, at the end of three or four days it reaches the apex of the curve. As the disease abates, there is a gradual fall in the sedimentation rate, so that in from two to four weeks it has become normal again. It was also noted that the sedimentation curve in the severe cases was higher than in the mild ones. A study of the material indicates that the sedimentation rate is a good criterion or diagnostic sign as to when the inflammatory process has completely subsided in the event that an interval operation is contemplated.

Perforation of the gall bladder during an attack of acute cholecystitis is a serious complication which is not uncommon. In the Lund Clinic, it occurred in 7.2 per cent of 310 cases. The diagnosis in many

the right side of the urinary tract he then discloses the relative frequency of urinary symptoms as well as urinary findings elicited during an attack of both the acute and chronic forms of appendicitis.

Six illustrative cases of acute and chronic appendicitis together with complete cystoscopic functional and roentgenographic studies of the urinary tract are presented in detail. All of the patients showed some form of anatomical alteration of the urinary tract varying from hydronephrosis to dilatation with stone formation and ureterectasia.

In the author's experience a great many of the patients with urinary symptoms pain and hematuria, from an anomaly on the right side of the urinary tract associated with appendicitis were definitely relieved of such symptoms by appendectomy.

GEORGE C. FIOLO, M.D.

Miller E. M., and Turner E. C. The Surgical Management of Appendicitis in Children. *Illinois M J* 1937 72 222

Miller and Turner review the results obtained during the past three years at Cook County Hospital, Chicago, in a series of 673 patients who were treated for acute appendicitis and its complications. All were children and the cases could be divided into 3 clinical groups.

Group I consists of 329 children whose histories and physical findings revealed acute appendicitis before the stage of perforation. There was no mortality in this early stage of appendicitis. All patients in this group except those in whom the infection was in the subsiding stage upon admission to the hospital were subjected to immediate operation.

Group II represents those patients who when first seen by the physician or surgeon showed a localized inflammatory mass. These were cases of perforation against which there had been set up from the start an adequate defense mechanism. The so-called appendiceal abscesses varied greatly in size and location. Some of these were as large as a small orange. The mass was palpable deep in the flank of some of the patients; in others it was found to be deep in the pelvis and even in the left lower quadrant. These abscesses may occupy any position in the right side of the abdomen and can be determined only by rectal or bimanual examination. The authors believe that conservative treatment is the best procedure for abscesses of this type. Following treatment patients are routinely advised to return in three or four months for removal of the appendix. Increase in size and spread of the abscess were evident in a few cases in this group and it is believed that the abscess may ultimately point anteriorly, laterally or deep in the pelvis. Under these conditions simple drainage through a small incision into what amounts practically to an extraperitoneal approach may be safely accomplished with a low mortality rate.

Group III comprises those cases of acute perforation lacking an adequate defense mechanism. They represent pathologically the obstruction type of

appendicitis with perforations of considerable size. The streptococcus may be the predominant organism. The findings tend to be generalized instead of localized while the acute general tenderness and rigidity suggest a rapidly spreading general peritonitis. While the treatment of this type of case has been the subject of wide controversy the authors believe that surgical removal of the source of infection, combined with adequate drainage when drainage seems to be necessary, is the most effective procedure for avoiding a fatal outcome. In these severe cases of spreading peritonitis, the resistance of the peritoneum becomes impaired in proportion to the degree to which the blood supply of the bowel is disturbed by gaseous distention. The use of the duodenal suction tube and the introduction of a catheter through the stump of the appendix or through the cecal wall constitute valuable measures which aid recovery. While it is certainly impossible to drain adequately the peritoneal cavity, nevertheless drainage with the rubber covered type of Penrose cigarette drain is routinely employed and a drainage is considered necessary. In retrocecal types of perforation such drainage may forestall the development of a subdiaphragmatic abscess. In this third group of 163 patients there was a mortality of 22.7 per cent.

JOHN W. LUTZ, M.D.

Gray H. K. and Mackenzie W. G. Acute Appendicitis: Analysis of Results of Both Operative and Non-Operative Treatment in 674 Consecutive Cases. *Surg Clin North Am* 1937 17 61

Group I contained 495 cases, 73.4 per cent of which are unperforated, acutely inflamed appendix was removed. Groups II and III each contained practically the same number of cases, 90, 13.3 per cent and 89, 13.2 per cent respectively.

It is striking to note that of all the patients who had acute appendicitis without rupture 90.6 per cent were less than forty years of age. In those cases in which perforation had occurred the age distribution by decades was more nearly equal and this probably suggests that when acute appendicitis occurs in the fourth, fifth and sixth decades it is more likely to progress to the point of perforation because of the greater difficulty in making a correct diagnosis.

Very little information could be elicited from a study of the sex incidence as the ratio of males to females was remarkably consistent in all groups, 52.7 per cent of all the patients were males.

The tendency to procrastinate before seeking medical advice has been proved to be unwise in many diseases and not the least important of them is acute appendicitis. Of the patients whose appendix was removed before perforation occurred 66.1 per cent sought treatment within twenty-four hours of the onset of the disease and 80 per cent were seen before forty-eight hours had elapsed. Of those patients in whom perforation had occurred and an abscess had formed only 18.8 per cent received professional medical care in the first two days of the disease whereas 40.4 per cent of the patients with diffuse

operated upon without waiting for the attack to subside."

Judd and Phillips—"We shall probably not be able to settle the question of when to operate in the acute cases, but the present tendency is to carry out surgical treatment early in cases of acute cholecystic disease. Apparently there is not the same fear of operating in these cases as there formerly was. Our study of this group of 508 surgical patients (operated upon at the The Mayo Clinic) would seem to hear out these conclusions, although the operations were performed by several surgeons, among whom there were bound to be differences of opinion.

.. Although we wish to subscribe to the plan of early operation in acute cholecystic disease, and although this coincides with the opinion expressed in the more recent literature on the subject, nevertheless we feel that there are certain instances in which surgical treatment should be postponed. In some cases it should be delayed for a long time. There is no set plan that will fit all cases. Cholecystectomy will not be permissible in every case, but this procedure should be carried out whenever feasible. . . No one would feel that a deeply situated, inaccessible, acutely inflamed gall bladder should be removed from an extremely sick person. Cholecystostomy may be all that is warranted."

Walter's experience in the management of such cases led him to believe that if the patient is seen in the early stages of the attack, operation can be carried out with safety. On the other hand, if the patients are not seen until the second or third day of the disease, and the infection should appear to be subsiding, he has found it of advantage in some of these cases to delay operation for one or more days. Although some generalizations may be made regarding the time for surgical attack, there is no doubt that the cases vary so much that decision in each case has to be made on the merits of the case, with particular reference to the condition of the patient and the progress of the infection.

In order to see whether such a viewpoint could be substantiated in the surgical results, Wesson and Montgomery reviewed the case histories of 76 consecutive patients with acute cholecystitis who were recently operated on at The Mayo Clinic, from January, 1934, to July, 1936. In this series there were 3 deaths, or a mortality of 3.9 per cent. In 65 of the cases cholecystectomy was performed. In the 11 cases in which cholecystostomy was performed, it was necessary to perform cholecystectomy in 2 instances in the subsequent year because of recurring symptoms. In all but 4 of the 76 cases stones were associated with the acute cholecystitis, and in 2 of these 4 cases the stone or stones had apparently passed into the common bile duct, and produced symptoms shortly after the patient's dismissal. In all but 3 of the cases there was a previous history of attacks of biliary-tract disease. The duration of the attack of acute cholecystitis which brought the patient to the hospital varied from a few hours to five weeks.

After discussion of the question of the proper time for surgical attack upon the acutely diseased gall bladder, the question of the anesthetic is of next importance. Generally speaking, in cases in which patients are seriously ill, the safest anesthetic in Walter's experience has been abdominal-wall block with procaine, supplemented by one of the gas types of anesthesia and the addition of ether as necessary to obtain relaxation. Spinal anesthesia has a very important place in operations on the obese individual with acute cholecystitis, as well as on patients with associated respiratory infections, such as bronchiectasis.

Whereas Walters is in accord with the opinion expressed by Stone and Owings in advising cholecystectomy, there is a group of cases, as Judd and Phillips have mentioned, in which the preferable procedure is cholecystostomy. In such cases the patients are usually obese, or elderly, and in poor condition, and exposure of the gall bladder and the common bile duct is difficult either because of the extent of the inflammation or the inaccessibility of the hepaticoduodenal ligament. The method of cholecystectomy described many years ago by W. J. Mayo for cases of this type has served to facilitate the ease of the operation as well as exposure of the common duct. The method consists of dissecting the gall bladder from the liver, by using the forefinger of the left hand and separating the gall bladder from the liver by blunt dissection just above the cystic duct. The gall bladder can then be easily dissected from the liver, reflected forward, and the cystic duct and cystic artery separately isolated. In such cases bleeding from the liver notch can be readily controlled by mattress sutures placed over strips of gauze occupying the position of the gall bladder in the liver notch. Such gauze tampons should not be removed until the ninth or tenth day, or should be left in place even longer if they appear to resist attempts at removal. The use of antiseptic solution poured into the sinus tract is of value in loosening the gauze from the liver. When the patient has been jaundiced and the common duct is enlarged, and when the condition of the patient permits, Walters has not hesitated to open and explore the common duct for stones, and in a few cases has found them to be an accompaniment of acute cholecystitis.

Postoperative care consists largely in treating symptoms as they arise. It is essential that an adequate fluid intake be maintained.

Kunath, C. A.: The Stoneless Gall Bladder. An Analysis of 100 Cases Treated by Cholecystectomy. *J. Am. M. Ass.*, 1937, 109, 183.

Kunath calls attention to a definite dyspepsia syndrome which includes gaseous indigestion, inability to digest fatty or greasy foods, belching, distention, vomiting, and flatulence, which he believes is largely responsible for the problem of the stoneless gall bladder. He reports a follow-up study of 100 uncomplicated surgical cases of non-calculous cholecystitis. A similar study for the purpose of

instances is extremely difficult. The logical treatment is prevention, and this can best be done by early operation before perforation has taken place. The ideal procedure is cholecystectomy with drainage of the operative site. The mortality in 9 cases of acute perforation was 55 per cent while in 14 cases of slow or subacute perforation it was 14 per cent.

Conservative medical treatment of acute cholecystitis did not yield satisfactory results. Of 117 cases which were not operated upon, re-examination after periods of from five to twelve years showed that about one fourth were symptom free. Of all the 144 cases not operated upon a follow up study after periods of from two to twelve years showed that 13.5 per cent had been operated upon later and 7.8 per cent of the cases had terminated fatally either without operation or in connection with an operation.

The material from the Lund Clinic seems to warrant cholecystectomy with choledochotomy when indicated performed as early as possible during the acute stage of the disease. Cholecystostomy should be done only when necessary. All severe cases of acute cholecystitis should be operated upon immediately without regard to the date of onset. Moreover, all cases of mild or moderately severe cases of cholecystitis should be operated upon during the first two or three days of the disease provided there are no specific contra-indications for the following reasons: (1) the acute process will then be cut short immediately and the risk of acute exacerbations associated with expectant treatment will be eliminated; (2) the patient's general condition and resistant powers are less affected the sooner an operation is done; and (3) as far as can be judged from the material from the Lund Clinic the late results in the cases operated upon early appear to be better than those in the case operated upon at a later stage. Cases of moderately severe or mild acute cholecystitis in which the symptoms are on the decline after the first few days should not be operated upon immediately but at operation during the healing stage it is a common experience to find the tissues adjacent to the gall bladder undergoing organization so that the technical difficulties of the operation are increased and an unnecessary risk is taken. In such cases the operation should be postponed until healing is complete, as indicated by the blood sedimentation levels.

In the Lund Clinic material common duct stones were found or their existence was thought highly probable in 17 per cent of the cases of acute cholecystitis. It is therefore a matter of some moment in dealing with cases of acute cholecystitis. There is no doubt that exploration of the common duct during cholecystectomy for acute cholecystitis adds to the risk of the operative procedure; however it should be done if the history and clinical and operative findings indicate the probability of common duct stones. Bilirubin values of over 300,000 or 200,000 or a urinary diastase value of 512 or more during any time of the acute stage should indicate a choledochotomy. It is relatively uncommon to find stones in the common duct in acute cholecystitis when the

gall bladder is found to contain a single stone and still more uncommon when there is a large stone obstructing the neck of the gall bladder or the cystic duct.

A follow up study after cholecystectomy for acute cholecystitis in 260 cases observed for periods of from two to twelve years shows good results in about two thirds of the cases; satisfactory results in about one sixth of the cases, and a less satisfactory or unsatisfactory result in about one sixth of the cases.

JOHN A. WOLFEK, M.D.

Walters W. Newer Concepts in the Management of Acute Cholecystitis. *Surg. Clin. North Am.* 1937 17: 961.

It is necessary to differentiate attacks of acute cholecystitis from those of subacute perforation of a duodenal or gastric ulcer. In such cases a previous history of an ulcer type of dyspepsia is always significant and assists in making the differential diagnosis.

Until 1933 the consensus among most American surgeons was that it was wise to postpone operating on a patient with acute cholecystitis until the acute manifestations of the inflammation had subsided, provided the patient's general condition continued to improve and there was an associated decrease in temperature, pulse rate and the leucocyte count. There were, however, certain advocates of immediate operation in cases of acute cholecystitis. At the 1933 meeting of the American Surgical Association a symposium on the treatment of acute cholecystitis was held. Three excellent papers were presented by Stone and Owings of Baltimore, Morris K. Smith of New York and Judd and Phillips of Rochester, Minnesota. A review of these papers seems to indicate an increasing tendency on the part of the clinicians to favor earlier operations in cases of acute cholecystitis.

Stone and Owings — "When the cystic duct is completely blocked and increasing tension develops within the gall bladder, there can be no reasonable hope of a spontaneous recession of the process. We think that by prompt operation there is a notable saving of time, pain, expense and danger as compared with the policy of delay. Not only do we regard the acute gall bladder lesion whether it drops empyema, torsion, gangrene or simple acute cholecystitis as best treated by prompt operation but again contrary to general opinion we believe that in most cases the operation should be a cholecystectomy."

Smith — "I have been impressed with the favorable postoperative course of patients subjected to early cholecystectomy and have operated before the fever subsided in a majority of my own cases without feeling that an error of judgment had been made until rather recently. Patients with acute cholecystitis should not be operated on immediately upon admission without an urgent indication. The surgeon should be ready to intervene promptly if progress is unfavorable. Younger patients in good condition after a day or two of preparation may be

adenocarcinoma, 12 per cent, (b) infiltrating adenocarcinoma, 56 per cent, (c) scirrhous adenocarcinoma, 25 per cent, and (d) mucous adenocarcinoma, 12 per cent

Inflammation and chronic mechanical irritation produce a variety of reactions in the gall bladder, and the type of reaction seems to determine to some degree the type of lesion formed. If the submucosa is more responsive than the mucosa, the resulting papilloma may be composed chiefly of connective-tissue elements covered with epithelium. Should the response be an overgrowth of epithelium, simple benign papillomas develop.

The appearance of squamous-cell carcinoma in the gall bladder is explained on the basis of metaplasia. One example was seen in the present series. Clinically, this type may resemble scirrhous adenocarcinoma.

Carcinoma may occur in any portion of the epithelium of the gall bladder, but it is estimated that from 80 to 90 per cent originates in the fourth of the mucosal area represented by the dome and neck of the gall bladder. This distribution again suggests the importance of calculi as an etiological factor. The site of the tumor obviously influences the course of the disease and clinical picture.

In general, carcinoma of the gall bladder disseminates by local extension, lymphatic metastases, and blood-borne metastases. Local extension is by far the most common method of spread, and the liver is involved earlier and more frequently than any other organ.

In 52 per cent of the patients, there was a history of gall-bladder disease of long standing, and in 70 per cent of those in which no such history was elicited, stones were found. After the onset of carcinoma, the clinical course is usually modified by symptoms referable to the tumor and its growth. The symptoms and signs, and their incidence in this series is as follows: pain in 69 per cent, loss of weight in 95 per cent, anorexia in 85 per cent, tenderness in 73 per cent, a palpable mass in 50 per cent, a palpable edge of liver in 50 per cent, jaundice in 48 per cent, and vomiting in 45 per cent. Leucocytosis, anemia, and chills and fever occurred less frequently. There were 7 atypical cases. Four of the patients had symptoms of obstruction of the common duct, 2 presented duodenal obstruction, and 1 had a condition which resembled hydrops of the gall bladder.

The diagnosis of carcinoma of the gall bladder is difficult to establish with certainty. A constant dull aching pain in the epigastrium or right upper quadrant, persisting over a period of weeks, is one of the most valuable features in the differential diagnosis. Cholecystograms are seldom said to be of aid. In 17 cases in which cholecystograms were made, a positive diagnosis of carcinoma of the gall bladder was not made by roentgen examination.

The results of treatment are not encouraging. Operations which consisted of exploratory laparotomy with removal of tissue for biopsy, chole-

cystectomy, cholecystostomy, and gastro-enterostomy were performed in 45 cases. Five patients were free of metastases at operation. One patient who was known to be alive and well two years following operation was subsequently lost from observation. The remainder succumbed at operation or shortly thereafter.

The author agrees with Graham that the most rational attack on this disease is its prevention by early removal of the gall bladder in all cases of cholelithiasis.

JOHN A. GIUS, M.D.

McCaughan, J. M., and Sinner, B. L. • Pancreatic Fistula: Its Medical and Surgical Management. *Arch. Surg.*, 1937, 35, 449.

External fistula of the pancreas may be classified as either complete or incomplete. The former must be exceedingly rare, as the greater number of reports encountered in the literature deal with external fistula of the incomplete variety in which there is only a partial loss of pancreatic juice. Fistula of the pancreas arises in various ways:

1 Following a drainage operation on the pancreas for an acute inflammatory condition.

2 Rarely, as a result of a stab or gunshot wound of the abdomen.

3 From injury to the pancreas in operations on the kidneys, stomach and duodenum, biliary tract, spleen, retroperitoneal tumors, and adrenal glands.

4 After partial resection of the pancreas, or excision of an islet-cell tumor for the relief of hyperinsulinism.

5 Following operation for calculi of the pancreatic duct.

6 Most commonly, after an attempt to extirpate a cyst of the pancreas.

The recognition of uncomplicated pancreatic fistula is not difficult, it is established by means of examination of the fluid for its reaction and its enzyme content. Duodenal fistula may be differentiated by the additional presence of bile and by the erosion of the margins of the wound.

The treatment of external pancreatic fistula is complicated first by the necessity of restoring pancreatic juice to the body in sufficient quantity and before serious physiological disturbances have taken place. Secondly, treatment is concerned with the attempts at closure of the fistulous tract. Conservative means should always be adopted in the beginning.

The authors review the literature which deals with the various forms of medical treatment employed. They believe that if these measures fail after a reasonable trial period, radical treatment should then be considered. The operative procedure, the technique of which is described in a case report, consists essentially of mobilization of the fistulous tract and its implantation into the nearest portion of the upper gastro-intestinal tract, preferably the stomach. The entrance of pancreatic juice into the stomach does not seem to have any deleterious effect on gastric digestion.

comparison was made on 100 consecutive cases of chronic cholecystitis with calculi. The only other operative procedure in both series of cases was simple cholecystectomy.

The age incidence was almost identical in both groups and averaged 42.3 years in the non calculous group and 41.9 years in the calculous group. The theory that the non calculous cases represent the earlier cases in respect to duration of symptoms before admission to the hospital was held with regard to both groups. It is interesting to note that females outnumbered males in both groups but there were more males in the non calculous group than in the calculous group.

From the standpoint of the symptoms it was found that symptoms were always more pronounced in the group with stones. Of the non-calculous cases 56 per cent gave a history of biliary colic which was accompanied by severe colicky pain requiring hypodermics for relief. It seems that causes other than stones are responsible for the biliary colic.

A careful study of both groups emphasized the fact that the non calculous cases showed a greater morbidity, a higher postoperative mortality and only about half as many cures.

Careful analyses were made from the standpoint of pathological change in the gall bladder wall of the non calculous cases. In a general way the percentage of good results rose steadily as the pathological processes in the gall bladder became more advanced. However there are some phases of these analyses which are somewhat perplexing. A disturbing factor is the relatively high percentage of cures in the group of patients with normal or nearly normal gall bladders. Many patients get relief from the symptoms after removal of a gall bladder showing very little pathological change. It appears that while histological changes may be nil or slight functional or physiological disturbances of the gall bladder which in no way produce any anatomical change can be present. Therefore a pathological report can offer no accurate index as to the possible benefit that may result from cholecystectomy.

From the standpoint of cholecystographic evidence again we meet facts that are difficult to explain. Cholecystography as a means of diagnosing gall bladder disease has come to be considered an accurate test in a high percentage of cases. As a rule cholecystectomy is rarely advised when there is a normal cholecystogram. Nevertheless in this study of Kunath it appears as a significant fact that 75 per cent of the patients with normal cholecystograms were cured. It is possible that incidental appendectomy is responsible for the cures in this group with normal cholecystograms. One is obliged to concede that while cholecystography is a contributing factor in the diagnosis of gall bladder disease it cannot be entirely relied upon either for diagnosis or prognostic purposes following cholecystectomy.

Kunath expresses the opinion which other investigators before him notably Burdea, Sanders, Judd, Palmer, Graham, and Mackey have ex-

pressed is that an analysis of pre-operative symptoms is probably of greater value in estimating the probable benefits to be derived from cholecystectomy than the cholecystographic evidence or the pathological report. The trend now is to regard the presence of definite biliary colic as the most dependable indication for cholecystectomy as well as the symptom most likely to be relieved by this means. Eighty six per cent of the patients with colic under investigation were cured. Of 100 cases in which vague dyspeptic symptoms were present prior to operation only 33 per cent were cured. Moreover the dyspepsia syndrome developed postoperatively in 35 per cent of the cases in which it was absent pre-operatively. Observations such as these seem to favor the view that the dyspepsia syndrome is more closely related to non function of the gall bladder than to disease of the gall bladder.

Kunath believes that the majority of the cases which showed no improvement must be explained on a basis of physiological change or altered function. He ventures the opinion that there probably is a large group in every series of non-calculous gall bladders lying on the borderline between organic and functional disease. It is difficult to diagnose these cases and the results after cholecystectomy are apt to be disappointing. A better understanding of the physiology of the biliary tract will doubtless help to remove much of the doubt and disappointment that are now so frequent in the treatment of the non calculous gall bladder. MARTIN J. SEITZ, M.D.

Cooper W. A. Carcinoma of the Gall Bladder
Arch Surg 1937 65 431

The author presents a comprehensive study of 48 cases of carcinoma of the gall bladder observed at the New York Hospital, New York City, in the period from 1915 to 1935. In addition he gives a brief historical résumé of the subject.

The apparent increase in the frequency of carcinoma of the gall bladder roughly parallels the increase in frequency of operations on the gall bladder. In 1500 operations on the gall bladder the surgical incidence of carcinoma was 3 per cent while the autopsy incidence was 0.61 per cent in 1931 cases.

Most of the patients were between the ages of fifty and sixty years and it was noted that infantile disease of the gall bladder was most common between the ages of forty and fifty years. Seventy seven per cent of the patients were women which is in agreement with other reports the ratio being roughly a woman to a man.

Of the various etiological factors chronic irritation incident to cholelithiasis and infection is the most constant finding. Stones were found in 79 per cent of the patients and 48 per cent gave a history of colic of long duration. Malignant degeneration of benign papillomas of the gall bladder is also possible.

Pathologically the disease may be divided into 2 groups: adenocarcinoma and squamous carcinoma. The former group is subdivided into (a) papillary

GYNECOLOGY

UTERUS

Strachan, G. I • *The Precancerous Cervix. J Obst & Gynaec Brit Emp*, 1937, 44 625

The author defines a precancerous condition as a pathological condition of the tissues which is likely to develop into cancer. The objective of this report is to indicate pathological features which show that in a particular instance there was at least a probability of the lesion present becoming carcinomatous. Since no one has ever observed a cell in the process of acquiring malignant properties, inference and deduction must figure prominently in considerations of the problem. This communication is based on the clinical and histological investigations of several hundred cervixes removed mainly because of chronic inflammatory lesions. In a small proportion, early carcinoma was found unexpectedly. The examination of 400 cases of true cervical carcinoma has been of corroborative value.

The main clinical precancerous cervical lesion is produced by the various effects of chronic infection, usually secondary to obstetrical trauma. Although a large variety of appearances is seen in the microscopic examination of chronically infected cervixes, the author herein considers changes regarded as predisposing to carcinoma in (1) the stroma, (2) the epithelium, and (3) the blood vessels.

The main connective-tissue lesion appearing to predispose to carcinoma formation in the cervix is subepithelial hyaline degeneration, seen only in long-standing cases. In studying the epithelial appearances in chronic cervicitis which may be regarded as precancerous, one suspicious feature is a separated clump of surface epithelial cells in the tissue. Another is the type of interpapillary downgrowths. These are usually of irregular disposition and depth, but in shape they are blunt-nosed, at times this appearance is altered and the cell columns are seen to be rather sharply pointed and of a penetrative appearance.

In the glandular tissue of the cervical canal the main change regarded as precancerous is a tendency for the glands to lose their racemose appearance and to revert to a simpler tubular type. This would represent a degree of metaplasia of the gland as a whole, and not of the epithelium lining it.

It is in the germinal layer that the earliest signs of carcinoma are seen. Careful examination of several sections of a particular specimen is called for in estimating the presence of precancerous changes of the cells. Of the constituent cells, those of abnormal size and shape should be studied for other characteristics of malignancy. In a non-malignant squamous epithelial cell the cytoplasm is evenly stained, but in a carcinoma cell the stain is absorbed quite unevenly, producing a mottled appearance. This characteristic, especially in the presence of mitotic figures,

indicates a tendency to carcinoma formation. A hyperchromatic appearance in a squamous epithelial cell, particularly if in a number of adjacent cells, and if associated with irregular staining and mitotic figures in the nucleus, indicates the probability that the cells are acquiring malignant properties. Mitotic figures in a number of cells indicate the actual presence of carcinoma, but if limited to a cell or two with surrounding and intervening cells, they indicate a precarcinomatous disposition. The size of the nucleus should be studied with care. In an isolated cell or two a nucleus larger than those in adjacent cells would indicate a tendency on the part of such a cell to become malignant.

The relation of the cells to the basement membrane has been studied. Carcinoma may be present before any penetration of the membrane is to be seen, but actual penetration of the basement membrane is a definite sign of malignancy. The view that metaplasia of the squamous epithelium, as the result of long continued irritation, may be responsible for some of these appearances of the adenomatous nature of chronic cervicitis, has been rather neglected. If the area of an erosion is examined at the junction of the squamous and columnar epithelium, many clumps of cells may be seen of an indeterminate appearance with, in some cases, a tendency to giant-cell formation so that it is impossible to determine their exact origin from squamous or from columnar epithelium. This appearance, being due to prolonged irritation and representing a reversion to an undifferentiated and embryonic condition of the cell, suggests that the undifferentiated cells may at any time become carcinomatous.

The author, in summarizing, notes that precancerous changes are limited to a few isolated cells, and in a particular cell the changes should be few. Thus, if a cell were to show nuclear mitosis, hyperchromatism, and increased relative and absolute size of the nucleus and nucleolus, the probability is that it is already carcinomatous and further search would probably confirm this by demonstrating similar changes in adjacent cells. Although it might be deduced that precancerous signs are numerous and easily identified, the reverse is the case, so that much tedious work with little tangible result is entailed in the search for the cervical precancerous lesion. The practical importance of this matter does not need any stressing. If cervical cellular changes which are not yet carcinomatous but are likely to proceed in that direction can be identified, a minor operation, such as amputation of the cervix, would save the patient from the terrors of carcinoma and represent prophylactic gynecology in the best sense. For this reason alone, the author is of the opinion that this matter requires further investigation until a better understanding has been attained.

HERBERT F THUPSTON, M D

The authors report in detail a case of incomplete pancreatic fistula following a Billroth II gastrectomy for neoplasm of the stomach. Conservative treatment over a period of eight or nine months had failed to effect a closure of the fistula or any significant diminution in the discharge from the fistula. They were able to inhibit or excite the flow with a number of drugs and food substances but they question whether these effects could be maintained over long periods of time. High voltage roentgen therapy had proved unsuccessful in a previous case and so was not again attempted.

Operation consisted in the mobilization of the fibrous fistulous tract, including a cuff of skin about the external opening. The tract was inserted into the stomach through an opening in the anterior wall. The tract was not stitched to the stomach wall but was held in place, without tension by the cuff of skin and the sutures closing the gastric opening in addition to which omental tags were sutured over the site of implantation. The authors warn against angulations or constriction of the tract in order to prevent reduction and cyst formation. There was a postoperative leak of gastric and pancreatic juice for about seventy-two hours. This however cleared up completely and the wound was entirely healed at the end of four weeks. The patient rapidly regained weight and strength.

Postoperative gastric analysis revealed the gastric contents to possess definite lipolytic activity. The degree of acidity as compared with that before operation was considerably lower. The authors believe this to be due to the fact that the principal acid forming area of the stomach was unable to compensate in the usual manner. Blood diastase was normal.

JOHN H. GARLOCK, M.D.

MISCELLANEOUS

Reinking J. J. Ultraviolet Irradiation during Operations by the Method of Havlicek (Bestrahlung während der Operation mit Ultraviolett nach Havlicek). *Zentralbl. f. Chir.* 1937 p. 1579.

Interested by Havlicek's work on circulation peritonitis and thrombosis the author visited him to see his control laboratory experiments to learn the theoretical backgrounds and particularly to observe the immediate mobilization of surgical patients. For the past year, all patients were ir-

radiated with ultraviolet rays during operation. Reinking carefully observed Havlicek's directions. No drastic cathartics nor large enemas were used in order to prevent activity of the empty intestinal loops and pendular peristalsis. Morphine and other alkaloids were also unnecessary because the patient no longer suffered from after pains. Inhalation anesthetics with ether and chloroform were avoided particularly in favor of local anesthesia as the patients stood up immediately after the operation. Furthermore, the liver which is the most important detoxifying organ in peritonitis was not damaged. There was no postoperative vomiting. If local anesthesia was inadequate Braun's sphincter anesthesia was added. The avoidance of general anesthesia led to careful and gentle operating. The operation should not be done mechanically. The operating room personnel should be well trained and familiar with every necessary procedure.

Collapse did not occur in irradiated patients on the contrary the threat of collapse was avoided by the irradiation. The Biosol A lamp of Philips of Holland was used for the irradiation which was cheaper than the original of Havlicek and produces the same results if Havlicek's original filter is used. By irradiation the arteriovenous short circuits are opened as can be seen from the fresh red color of bowel or omentum that have been exposed to the rays for some time. The circulatory rate and therefore the blood pressure in the portal system are increased. Postoperative meteorism is also a circulatory problem. The circulation is improved by irradiation and meteorism is avoided. On the other hand peristalsis is stimulated and the danger of intestinal paresis is removed. The patients feel refreshed after the irradiation. The alkali reserve of the blood is increased. One must avoid over irradiation which may cause a severe alkalosis with excitation and motor unrest and occasionally convulsions with clouding of the consciousness. The patients in such cases recover with acidification. The author has had 5 patients with such complications all of whom recovered. The immediate arising from the operating table brings the bowel loops and omentum into their natural position at once without the delay which follows if peristalsis is expected to accomplish this. Abdominal banders are not necessary; a local dressing with adhesive is sufficient.

(Book.) LEO M. ZIMMERMAN, M.D.

to carcinomatous degeneration. It is for this reason that surgical treatment of fibroids is the method of choice inasmuch as epitheliomas of the body of the uterus are highly resistant to irradiation. Indeed, in reviewing the literature the authors have found many reports of a rapidly developing carcinoma of the cervical stump following hysterectomy for fibroids, or of a rapidly developing carcinoma of the uterus extending into the pelvic cavity following radium therapy for the treatment of fibroids.

In the opinion of the authors it is therefore essential that in any subtotal hysterectomy the surgeon inspect the uterine cavity for the presence of carcinomatous changes. In their presence, he should remove also the remaining stump. In certain gynecological conditions it is also necessary, before administering roentgen irradiation, to rule out the possibility of a malignancy involving the uterine mucosa by simple means, such as hystero-graphy or a diagnostic curettage.

Other conditions clinically producing a metrorrhagia and easily confusable with a malignancy are endometrial hyperplasia, or functional metrorrhagia, and uterine polyps, which may or may not coexist with a carcinoma. In the presence of a polyp of the neck of the uterus in an elderly woman a carcinoma should always be suspected, and the diagnosis should be confirmed by means of a diagnostic curettage.

The authors finally discuss carcinomas involving both the neck and body of the uterus. The diagnosis is usually made by careful gynecological examination. The carcinomatous changes involve the neck as well as the body of the uterus, and large infiltrated ligaments are present. Carcinomatous changes can be demonstrated in the uterus following diagnostic curettage. In operable cases Wertheim's operation preceded by radium treatment is probably the method of choice. The preliminary administration of radium is of great value because the subsequent hysterectomy may be performed in one step.

RICHARD E. SOMMA, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Glasunow, M. • The Histology and Histogenesis of the So-Called Cilio-Epithelial (Serous) Cystomas of the Ovaries (Histologie und Histogenese der sogenannten cilioepithelialen (serösen) Cystome der Ovarien) *Arch f Gynaek*, 1937, 164 358

The author has studied the epithelium of cilio-epithelial ovarian cystomas and concludes that this epithelium, although quite diverse in form, is uniform in character. According to his view, it presents such marked similarities to the various characteristics of the tubal epithelium that an identity must be considered.

He believes, therefore, that three possibilities must be accepted for the derivation of cilio-epithelial cystomas, they are derived from (1) the investing epithelium of the ovary with a differentiation toward the epithelium of the tube. (2) the embryonal rests of the Muellerian epithelium in the ovary, and (3)

implants of the tubo-uterine epithelium. He proposes, therefore, to designate cilio-epithelial cystomas as tubo-epithelial cystomas or Muellerian cystomas.

Further investigations showed him that the epithelium of the cilio-epithelial cystomas is also able to secrete mucus. The epithelium of the tubes is also able to form mucus to the same extent as the cells of the cilio-epithelial cystomas. He believes therefore that some of the pseudomucinous cystomas are only functional varieties of the cilio-epithelial cystomas, that one cannot distinguish, at present, which of the pseudomucinous cystomas have a teratomatous or non-teratomatous character.

(FAUVET) J. M. SALMON, M.D.

Kahr, H.: When Is a Bilateral Ovariectomy Indicated in Unilateral Ovarian Tumors? (Wann ist bei einseitiger Ovarialgeschwulst die Entfernung beider Ovarien angezeigt?) *Wien klin Wchnschr*, 1937, 2 1083

The problem why in some ovarian tumors both ovaries become affected, is not yet solved. In the primary ovarian carcinoma we assume that the neoplasm develops bilaterally on the basis of the similar receptivity in both germinal glands. The metastatic ovarian carcinomas, which are nearly always bilateral, are the result of retrograde lymphatic transport from the carcinomatous lymphatic glands of the retroperitoneal cavity which receive the cancer particles from the primary cancer of the stomach, bowel, or gall bladder. The decision when both ovaries should be excised in cases of ovarian blastomas, cannot be made definitely. Evidently excision is indicated as a matter of principle, in order that the sections of the excised tumor can be studied thoroughly in every ovariectomy. If there is a doubt as to the results, a section of the frozen tissue under the microscope will give a definite diagnosis. The author believes that this procedure ought to be used more frequently. When this is not feasible, a section of the healthy appearing ovary should be examined. If this section appears to be normal, a few stitches will suffice to control the insignificant hemorrhage.

All the proliferating ovarian tumors are classified by the author in a very comprehensive table. The stromatogenous, the epithelial, and the teratoid tumors are separated into distinct classes. The ovarian fibromas are bilateral in 14 per cent of all the cases. Although ascites is frequently encountered, the healthy ovary may be left *in situ* if the affected ovary contains a benign tumor. In the sarcomas the percentage is essentially higher (35 per cent). Despite the malignancy of sarcoma, a unilateral ovariectomy may be risked in children and very young women, provided the tumor is limited within an intact capsule. In cystadenoma pseudomucinosum, which is bilateral in 6 per cent of the cases, a unilateral operation is sufficient up to forty years of age.

In papillary cystadenoma cilio-epitheliale serosum both ovaries are involved in 50 per cent of the cases. In view of the frequency of malignant degeneration,

Mathey Cornat M R External Roentgenotherapy (Transabdominal) as the First Stage in the Treatment of Cervico Uterine Carcinoma (*De la roentgentherapie par voie externe—transabdominale—comme premier temps du traitement du cancer cervico uterin*) *Presse med* Par 1937 45 1243

Mathey Cornat believes that in the majority of the cases fractionated external roentgen irradiation must precede intracavitary radium treatment or intravaginal direct roentgenotherapy.

For the external transcuteaneous irradiation the author prefers to give 300 kv because the treatment is conducted with greater ease and the dose is better tolerated by the patient. The author prescribes an intensity of 10 roentgen min a focal distance of 80 cm or eventually 1 mm. The dose per field can be raised to 3 500 roentgens the deep dose reaching a minimum of 4 000 roentgens.

The initial external irradiation is continued to about the middle of the treatment i.e. about one half of the total dose is given at about the twentieth or twenty fifth day. The patient is carefully watched the regressive changes of the lesion are observed and as soon as the neck of the uterus is permeable utero vaginal intracavitary radiumtherapy is immediately instituted. If no improvement follows however the external irradiation is continued until the entire dose has been given and then radium therapy is instituted. The roentgen radium treatment usually requires several weeks. It may have to be interrupted occasionally for a few days to give the patient rest and medical treatment such as the administration of glucose serum and insulin.

Aside from a few disadvantages preliminary external roentgen irradiation is better tolerated by patients who when first seen are emaciated anemic and have a very low resistance. It does not cause shock as is observed in intracavitary radium treatment. Following the first few roentgen treatments the patient feels relieved the appetite improves sleep is quieter the hemoglobin rises and the arterial tension is increased. The chances of infection are decreased.

Locally external preliminary irradiation causes favorable changes in the neck of the uterus the neoplastic lesions become aseptic the vagina is cleansed and the tumor is reduced in size. The uterus becomes more movable without manipulation and without the aid of surgical procedures in which lymphatics are opened.

The most important and valuable result of preliminary x ray treatment is the restoration of the permeability of the neck of the uterus. The favorable action of this treatment is especially marked for malignancies which are classified as of the second or third degree.

The author has treated in this fashion a total of 316 cases which he followed up from 1932 to 1935. In from 48 to 49 per cent of the early cases the results were favorable. In advanced cases the results obtained were satisfactory in from 40 to 41 per cent of the patients. The total percentage of cases

treated successfully by means of this method was from 44 to 45 per cent.

The combined roentgen radium treatment as outlined above requires a hospitalization of several weeks. Of course the treatment may be modified from case to case. RICHARD E. SOUSA M D

Moulouguet P and Gasne L Diagnosis of Carcinoma of the Body of the Uterus (*Diagnostic du cancer du corps de l'utérus*) *Gynecologie* 193 36 387

Moulouguet and Gasne state that the diagnosis of carcinoma of the body of the uterus is usually made in a woman who several years past her menopause suddenly begins to bleed vaginally. This bleeding is also usually accompanied by pain in the abdomen.

This diagnosis however presents great difficulties in certain cases because of the fact that the symptoms are not strictly pathognomonic of carcinoma of the uterus. In fact, this malignant condition may manifest itself under a great variety of clinical signs.

In the first place the authors point out that a metrorrhagia appearing soon after cessation of the menses is not at all indicative of a malignancy because it may be due to

1 Medical causes the result of a hemorrhagic syndrome or it may occur in the course of a myocardial insufficiency.

2 A so called infectious metrorrhagia now known to be due to an atresia of the cervical canal with distention of the uterine cavity accompanied sometimes by a pyometritis. Certain polyps involving the neck of the uterus may also arise on an infectious basis.

3 Procidencia. This may also be a cause of metrorrhagia in elderly women.

4 The development of an ovarian tumor. In these cases the diagnosis is especially difficult. Among these tumors the folliculoma is perhaps the most important. This neoplasm produces sufficient folliculin to cause periodic or irregular bleeding. These hemorrhages may be profuse and may be believed to be due to carcinoma of the body of the uterus. Being of small volume these tumors usually escape detection even with a most careful gynecological examination.

The authors state that in general any ovarian tumor whether benign or malignant whether of endocrine or non endocrine character may give rise to metrorrhagia after the menopause and may consequently be easily confused with carcinoma of the body of the uterus.

Concerning carcinoma of the body of the uterus occurring before the menopause the authors state that clinically these cases are characterized by a metrorrhagia which does not present any special features. The problem is further complicated by the fact that in relatively many cases fibroids of the uterus are complicated by a carcinoma of the endometrium. It has been demonstrated that a fibromatous nucleus predisposes the endometrium

menopause, a number of the patients also had some local infection

The treatment of pruritus vulvæ must depend upon the cause. When the cause is purely local, local applications in various forms are indicated. The author does not favor the use of alkaline soaps, the use of various oils or soaps medicated with acids is preferable for cleansing and bathing. If sitz baths are employed they should be cool, or only slightly warm, and acidified. Douche baths are preferable to sitz baths, the author believes, these also should be cool, or only slightly warmed. When the cause of pruritus vulvæ is a cervicovaginal infection, vaginal injections are indicated. Among the many drugs advocated for these vaginal injections, the author has found silver nitrate in weak solution, 1 : 2,000, most valuable, the dilution used has a pH of approximately 6.5. The injections are given daily in such a way that the vulva is also bathed with the solution. Experiments have shown that silver nitrate in dilutions weaker than that employed therapeutically destroys both bacteria and fungi in culture. In some cases vaginal suppositories may be employed, in trichomonas infection, the author has found stovarsol of value.

Various lotions, powders, and topical applications are employed for the local treatment of pruritus vulvæ. For the immediate relief of the pruritus the use of a solution containing chloral hydrate and carbolic acid, applied as a cold compress, is often of value. For topical application the author uses silver nitrate in a 1 to 15 concentration, in some cases he uses some of the modern dye preparations, especially gentian violet in a 1 per cent solution containing glycerine. Various forms of electrotherapy and the infra-red rays have been used in the treatment of pruritus vulvæ, but the author has had no personal experience with them. The x-rays in small, moderately penetrating doses have been employed in some cases which were resistant to all other forms of treatment, the author is of the opinion that radiotherapy is indicated only in the exceptional case.

In cases where the pruritus is associated with some general condition, the chief factor in its treatment is the relief of this condition. In diabetes the pruritus often disappears when the diabetes is well controlled. In some cases supplementary local treatment is indicated. In patients with marked nervous irritability, the use of sedatives and psychotherapy is indicated. Some authors advise the use of desensitization treatment in pruritus vulvæ, in some cases autohemotherapy gives good results. In syphilitic cases, antisyphilitic treatment is indicated.

Hormonal therapy is indicated in cases in which there is evidence of deficiency of the follicular hormone, i. e., in cases of amenorrhea or oligomenorrhea, or in the menopause, whether physiological or artificial. The folliculin preparation is given usually by subcutaneous or intramuscular injection in doses of 3,000 to 50,000 international units weekly. The hormone may be given by mouth, but as it is less active by this method, it must be given in larger doses.

Administration by mouth is indicated especially when hormonal therapy is used only as an adjunct to other therapy, or as a method of continuing treatment after a series of injection treatments. Some gynecologists employ local applications of folliculin in an ointment. If folliculin is given in sufficiently large doses and treatment continued for two months or more, good results are obtained not only in the relief of pruritus, but also in improvement of other conditions.

ALICE M. MEYERS

Cotte, G. The Surgical Treatment of Pruritus Vulvæ (Traitement chirurgical du prurit vulvaire) *Gynec et obst*, 1937, 36 257

Cotte notes that only exceptional cases of pruritus vulvæ which are resistant to all methods of medical treatment require operation. He has operated in only 5 cases, although he has treated a number of cases of pruritus vulvæ, as have most gynecologists. These 5 cases were not from his own practice but were referred to him by dermatologists who had employed many methods of treatment without result.

Provided that all local causes for pruritus vulvæ have been ruled out, and that there is no pelvic disease that may be the causative factor, surgical treatment may be indicated when all other methods have failed and the pruritus is severe. Partial vulvectomy may be done if the vulvar lesion is well localized. In aged women a total vulvectomy may be done if there is no associated kraurosis. As a rule, the pruritus without evident local cause is a trophic condition, and operation on the sympathetic nervous system is indicated for its relief if surgical measures become necessary.

The operations most frequently proposed for pruritus vulvæ are resection of the internal pudic nerve, resection of the presacral nerve, and periarterial sympathectomy. The pudic nerve contains many sympathetic fibers, and also some sensory fibers belonging to the cerebrospinal nervous system. If the pudic nerve is sectioned above the point where it divides, an anesthesia of the clitoris results, yet it must be sectioned above this division if the operation is to give relief from pruritus vulvæ. Hence the author is of the opinion that this operation should be employed only if the woman has ceased all sexual activity.

The author prefers resection of the presacral nerve in every case in which there is no contra-indication to laparotomy. This operation does not interfere with the sexual functions. Also it makes it possible to detect any pelvic lesion which may not have been found by clinical examination, but which might be the cause of recurrence of the pruritus. This operation involves practically no risk. The author performed resection of the presacral nerve in the 5 cases of pruritus vulvæ in which he operated. Of these, 2 were completely cured, 2 improved, and 1 was unimproved. The latter was subsequently cured by a secondary operation for resection of the internal pudic nerve. The author is of the opinion, as indicated by the case cited, that a combination of opera-

castration should be done at thirty-five to forty years of age. If the cysts are ruptured, hysterectomy should also be done at the same time. For the fibro-adenoma cysticum, which is nearly always unilateral, as well as for tumors of the Brenner type, the excision of the affected ovary is sufficient.

In all the cases of benign blastoma discussed, the uterus should be left *in situ*, even though both ovaries must be excised. The dangers arising from the functionless uterus are so insignificant that the more serious extirpation of this organ is justifiable only if technical causes, such as the necessity for drainage or special indications as ruptured cysts in cystadenoma serosum, are present.

In carcinomas arising from the cystadenoma pseudomucinosum, which are bilateral in 6 per cent of the cases, and in carcinomas from the cystadenoma cilio-epitheliale serosum, which are bilateral in from 40 to 50 per cent of the cases, radical surgery is the only therapy to be considered. In dysgerminomas, which are usually unilateral, the healthy ovary may be left in children and women between twenty and thirty years of age if the tumors are still in a firm capsule. In metastatic ovarian carcinoma, the extirpation of the uterus together with both ovaries is the only procedure to be considered. The last group of the epithelial tumors includes the very interesting endocrine active tumors, especially the granular cell tumors, which are bilateral in 7 per cent of the cases, the arrhenoblastomas, mostly bilateral, and the hypernephroid tumors, also mostly bilateral. Although the granular cell tumors are histologically malignant, clinically they may be regarded as comparatively benign, therefore in children and young women the healthy ovary may be left intact. For the arrhenoblastomas or masculinizing tumors, the simple ovariectomy is fully justifiable. For hypernephroid tumors, definite advice cannot be given as they are very rare. The last group, teratoid tumors, includes the dermoid cysts, the teratoblastomas, and the ovarian strumas. The dermoids are bilateral in 13 per cent of all cases. As they are benign and only one ovary is affected, the extirpation of the tumor is sufficient. If bilateral and occurring in young women, the blastomatous tissue should be carefully dissected out of the ovarian substance. After this procedure, not only the menses but also labor was observed to occur. In the malignant teratoblastomas, which are nearly always unilateral, even the radical operation is seldom successful. In ovarian strumas, the unilateral ovariectomy is always sufficient.

(HANS HEIDLER) MATTHIAS J. SEIFERT, M.D.

EXTERNAL GENITALIA

Vayssière, E. The Etiology and Medical Treatment of Pruritus Vulvæ (Aperçu étiologique et traitement médical du prurit vulvaire). *Gyn. et obs.* 1937, 36, 209.

Vayssière discusses the etiology and treatment of pruritus vulvæ on the basis of his own clinical experience and the replies to his questionnaire sent to a

number of French gynecologists. The incidence of pruritus vulvæ in gynecological and obstetrical practice varies from 5 to 10 per cent. The author's own statistics indicate that it occurs in 75 per cent of gynecological patients and in 10 per cent of pregnant women.

The causes of pruritus vulvæ are numerous. Many excretions and secretions, not only from the anus, the urethra, and the cervicovaginal canal, but also from numerous sweat and sebaceous glands, the Bartholin glands, the perineurethral glands, and Skene's glands, come in contact with the vulva. If any one of these excretions or secretions becomes infected or pathologically altered so as to be irritating, it may be the cause of irritation and pruritus of the vulva, especially of the internal surface of the labia majora and the clitoris. Among such local causes, leucorrhea is of chief importance, and this fact is often recognized by the patient herself. The use of irritating soaps and caustics and prolonged Sitz baths may also be the cause of pruritus vulvæ. In cases in which no local cause can be discovered, the cause of the pruritus may be an infection confined to a gland or a very small area. The author has found that the pruritus of pregnancy is often due to an infection with monilia albicans; this infection is associated with pregnancy particularly because the characteristic hypersecretion of the cervical glands furnishes a particularly favorable medium for the growth of the monilia. Trichomonas vaginalis infection, a frequent cause of leucorrhea in non-pregnant women and also occurring in pregnancy, may cause severe pruritus vulvæ. Infections of the rectum, of the bladder, and of the uterine adnexa may also produce pathological changes in the excretions and secretions which come in contact with the vulva, thus causing pruritus.

Various general conditions and diseases, toxæmia and endocrine disturbances, especially may be the cause of pruritus vulvæ, chief among the latter are icterus, albuminuria, and diabetes mellitus. Recent studies of the female sex hormones have shown that pruritus vulvæ may be associated with ovarian dysfunction and particularly with deficiency of the follicular hormone. The author, at one time skeptical in regard to the hormonal origin of pruritus vulvæ, has become convinced from his study of 190 cases that the so-called essential pruritus is usually of hormonal origin. In these 190 cases, there were 56 without menstrual disturbances, of these there were 28 with pathological leucorrhea, which was due to various bacterial and mycotic infections, cervicitis and cervical polyps, 15 with infections of the vestibule, 10 of the urethra, Bartholin's and Skene's glands, and the bladder, 1 with a uterine fibroma, 5 with intertrigo, herpes, or other dermatosis, or rectitis, and 7 in which the cause was not determined because of incomplete study. There were 7 diabetic patients and 61 pregnant women, 45 of whom had an infection with trichomonas or monilia or both. There were 33 patients with definite evidence of ovarian dysfunction and 31 in the physiological or surgical

menopause, a number of the patients also had some local infection

The treatment of pruritus vulvæ must depend upon the cause. When the cause is purely local, local applications in various forms are indicated. The author does not favor the use of alkaline soaps, the use of various oils or soaps medicated with acids is preferable for cleansing and bathing. If sitz baths are employed they should be cool, or only slightly warm, and acidified. Douche baths are preferable to sitz baths, the author believes, these also should be cool, or only slightly warmed. When the cause of pruritus vulvæ is a cervicovaginal infection, vaginal injections are indicated. Among the many drugs advocated for these vaginal injections, the author has found silver nitrate in weak solution, 1 : 2,000, most valuable, the dilution used has a pH of approximately 6.5. The injections are given daily in such a way that the vulva is also bathed with the solution. Experiments have shown that silver nitrate in dilutions weaker than that employed therapeutically destroys both bacteria and fungi in culture. In some cases vaginal suppositories may be employed, in trichomonas infection, the author has found stovarsol of value.

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ALICE M. MEYERS

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tions may give the best results in pruritus vulvæ. Procedures that may be necessary are vulvectomy and resection of the internal pudic nerve, resection of the presacral nerve with hypogastric periaarterial sympathectomy, and section of the superior hemorrhoidal plexus. If the laparotomy shows the presence of a pelvic lesion this should be treated even if its relation to the pruritus is not evident. In regard to the resection of the internal pudic nerve it seems best to reserve this as a second operation for the cases in which pelvic sympathectomy does not give complete relief. The fact that the perineum and the vulva have a double sympathetic nerve supply by way of the hypogastric ganglion and by way of the internal pudic nerve or the periaarterial plexus of the hypogastric artery may make it necessary to operate on the nervous fibers of both routes. It may be advisable to supplement the operative treatment by a desensitization treatment to consolidate the results.

WILKIE M. MEYERS

Medina J. Surgery of Carcinoma of the Vulva (A cirurgia do carcinoma da vulva) *Ann. bras. de gynec.*, 1937, 2, 117.

Medina states that in carcinoma of the vulva as well as in carcinoma of the cervix it is primarily important to remove the cellular connective tissue through which the lymphatics pass, but futile to hunt for invaded glands. In cancer of the vulva no studies have as yet been made which are analogous to those made in cancer of the cervix as to the percentage of cases in which collections of tumor cells occur in the perivulvar connective tissue. In vulvectomy only the superficial and deep inguinal glands should be removed, which is an easy procedure and does not increase the gravity of the operation. Removal of the iliac and hypogastric chains should be attempted only in exceptionally favorable cases, although the iliac glands should be investigated in carcinoma of the clitoris. These principles are logical because the lymphatics of one section of the vulva Bartholin's gland drain into the aorectal glands and also because recurrences are almost always situated in the scar and not in the glands.

The author describes the distribution of the vulvar lymphatics and outlines Icham and Amreich's operation with illustrations. M. E. MORSE, M.D.

Goebel A. and Hamann A. The Clinic and the Therapy of Carcinoma of the External Genitalia. I. The Clinic and the Therapy of Vulvar Carcinoma (Zur Klinik und Therapie der Carcinome am äusseren Genitale. I. Teil. Zur Klinik und Therapie des Vulvacarcinoms; *Zentralbl. f. Gynæk.* 1937, p. 1504).

For more than a period of seven years the departments of gynecology and actinotherapy of the St. George General Hospital in Hamburg have held weekly conferences to decide upon the treatment of their patients with gynecological carcinoma. The cooperation of the surgeon and the actinotherapist

and the after care of the patient are considered very important. During the period from July 1, 1935 to Nov. 1, 1936 there were admitted 69 patients with vulvar carcinoma. This amounted to a frequency of carcinoma of the external genitalia in 0.7 per cent of the total number and 2.4 per cent of the gynecological carcinomas. Of these 69 cases 8 were recurrences, hence only 61 cases could be considered in this series of these 38 were under observation longer than five years, and 23 for a shorter period. The average age of the 61 patients was sixty-two years, the extremes being thirty-six and eighty-eight years. Kraurosis vulvæ was diagnosed only 3 times, leucoplakia only twice, condyloma and papilloma each only once as early stages of a subsequent vulvar carcinoma. The labia majora were most frequently involved; the carcinoma was bilateral in 23 patients. This is significant as carcinoma in the region of the urethra and of the clitoris usually had extended to both labia.

Surgical therapy was given in 12 cases, surgery and actinotherapy in 40, actinotherapy in 4, and symptomatic treatment in 5. The operative technique depended upon the site involved; the carcinoma was widely encircled by a funnel-shaped incision with the electric cautery either singly or bilaterally, and the carcinomatous tissue lifted out of its bed. In 16 patients the inguinal lymph glands were excised. A sharp scalpel was used and the operation was limited to scraping out the debris from the superficially located lymph gland, which often were found to be already broken down. Of the 52 patients with vulvar carcinomas that were treated surgically 2 died of lung embolisms.

Five to six weeks after diathermic cauterization according to the method of cooperative treatment the prophylactic roentgen ray exposures were applied to the inguinal glands. For each side from 4 to 8 sub-divisions of the entire dosage were given, which was equivalent to a massive dose of from 1,600 to 2,400 roentgens, 10 from nine to sixteen days. When the glands were excised the roentgen treatment was given from three to four weeks later in the same manner as described.

Inoperable gland tumors were treated according to their extensiveness with radium needles and an distasteful moulage or protracted fractional roentgen therapy with a high total dosage of from twelve to fifteen times 300 roentgens. A postoperative roentgen treatment of the vulva was undertaken only when the operation could not be done radically in a healthy patient.

Of the 38 patients observed over a five-year period 10 were living without any complaints, 23 had died of carcinoma, and 3 had had recurrences. These findings correspond to an absolute cure in 26.3 per cent. Of the 23 patients observed during a period less than five years 12 were living, 9 had died of carcinoma, and 2 had had recurrences. Of the 61 patients in both groups 39 had died, 34 of these died from the carcinoma, 18 were still in the hospital, therefore, 16 deductions as tabulated are presented.

The five-year cures of vulvar carcinoma, which in his cases comprised 26.3 per cent, were compared with those reported in the literature during the period from 1930 to 1936. In the latter group, the five-year cures averaged 24.3 per cent, which is more favorable than the positive cures in portiocarcinoma.

(HANS HEIDLER) MATHIAS J. SEIFERT, M.D.

Lanterwein, C.: Cysts and Glands of the Vagina (Cysten und Druesen der Scheide) *Ztschr f Geburtsh u Gynaek*, 1937, 115 141

This study is based upon 70 cases of cysts and glands of the vagina in adults. As to the pathogenesis of these structures, the author relies upon more recent knowledge of the development and errors of development of the vaginal epithelium.

The size of the cysts varied from that of a pea to that of a bean. Cysts about the size of a walnut seem to be most frequent. The differences in size appear to be dependent largely upon mechanical factors, for example, cysts deeply situated in the tissue must overcome greater resistance in their enlargement than those located superficially. The cysts also swell before the menstrual period, analogous to endometrioid rests in the vagina. Because of secretory pressure and proliferation, cysts superficially situated may develop so actively in the direction of least resistance, i. e., toward the vaginal lumen, that they become pedunculated. Deep-lying cysts with little protuberance may simulate the appearance of cystocele or rectocele.

The cysts seem to have a predilection for certain localities, particularly the lower third of the anterior wall and the upper third of the posterior wall. Muscular fasciculi situated in the cyst wall are to be regarded as pre-existent muscular elements of the vagina. Therefore, only deeply situated cysts present noteworthy elements of this character and one may not speak of "cyst musculature." The vessels of the surrounding tissues are usually much engorged, and hemorrhages occur. Superficially, that is, outwardly, toward the vagina, the cysts have a covering of pavement epithelium corresponding to their location and with varying signs of dilatation. Subepithelial round-cell infiltration is frequent.

Chiefly through the work of Meyer, the former view, according to which the formation of the vagina was attributed solely to the ducts of Mueller, must be modified as follows: the vagina is indeed formed from the ducts of Mueller, but the epithelium of the ducts is lost and is replaced by the epithelium of the urogenital sinus. Therefore, the pavement epithelium of the vagina is derived from the urogenital sinus, the mucous epithelium of the cervix, however, is derived from the epithelium of Mueller's ducts. In the replacement of the Mueller epithelium by the sinus epithelium, especial "difficulties" result in the lower third of the vagina which may lead to a persistence of the Mueller epithelium. The fornix of the vagina and the median plane of the anterior and posterior wall are also favorite situations for developmental defects arising in this connection.

Closer analysis of the cysts shows, in fact, that an important rôle in their development must be conceded to the Mueller epithelium, that is, to the persistent rests of this epithelium. This may also be expressed in figures of 37 cases in which cysts or glands were derived from Mueller epithelium, 27 showed a lining of pure mucous epithelium, 9, a mixture of mucous and pavement epithelium.

Next in frequency to the Mueller epithelial cysts were the vaginal cysts derived from the para-urethral duct-rests or the vestibular glands. Of these there were about 13 cases.

Cysts of the Wolffian ducts were recognized in 3 cases. They are distinguished by their location in the lateral walls and by a characteristic epithelium, arranged in one row, devoid of mucus, cuboid in form, and possessing rather round nuclei rich in chromatin. By dilatation of the cysts, of course, the epithelium may be flattened considerably, this circumstance, like mechanical relationships in general, must in all cases receive special consideration in interpretation. Other cysts originate in adenofibrosis of the vagina, such as ectopic endometriosis. Of this type there were 2 cases.

In 5 cases, particularly after perineal lacerations and operations, traumatic epithelial cysts were recognized.

(FROBOESE) J. M. SALMON, M.D.

MISCELLANEOUS

Muret, M., and Rapin, O. J.: The Treatment of Urinary Incontinence in Women (Du traitement de l'incontinence d'urine chez la femme) *Gynec et obst*, 1937, 36 81

Urinary incontinence may be intermittent, partial, or total, and is painless. There are two main classes of urinary incontinence, namely, urethral and vaginal, the latter being due to a vesicovaginal, uterovaginal, or ureterovaginal fistula. Only the first class is considered in the present article and in its discussion cases of congenital and nervous origin, whether organic or functional, are excluded, as these cases, if not incurable, should respond to special medical measures.

After reviewing the anatomy of the urethra and the mechanism of closure of the bladder, the author proceeds to consider the pathogenesis of urinary incontinence. The two principal causes are protrusion of the anterior vaginal wall at the sphincter level, and certain local lesions including muscular tears, lacerations, or cicatrices at the level of the sphincter of the bladder or in the vicinity of the urethra. Local examination in cases of the first type will reveal a more or less pronounced prolapse of the anterior vaginal wall, which is exacerbated on sneezing or straining. A few drops or small jet of urine will escape during such exertion, but this is checked if an attempt is made to keep the anterior wall of the vagina at the level of the urethrovaginal orifice, or if during the examination the index finger is inserted to push the vaginal walls upward. The anterior wall of the vagina is intimately connected with the posterior

wall of the urethra which is therefore pulled down with it. As the anterior wall of the urethra is fixed it cannot descend and there results a funnel like dilatation of the posterior segment of the urethra due to traction on the trigonal sphincter. As soon as intra abdominal pressure is increased the latter opens and permits urine to escape. This also occurs when there is a urethrocele near the neck of the bladder, even if the lower vagina and urethra have not descended. If a colpocele is located above the sphincter region there is no incontinence for the reason that the urethral walls remain parallel and the sphincter remains intact.

Cystoscopy will reveal gaping of the sphincter and flattening of its inferior margin. Vaginal prolapse is sometimes so slight that its importance in the pathogenesis of incontinence is often unrecognized.

The authors discuss the views of Stoeckel, who is the chief advocate of the theory that organic and traumatic lesions are the cause of incontinence. They call attention to a peculiar geographical distribution of adhesions and cicatrices of the trigonal sphincter which are more common in Berlin than in Vienna and Lausanne. It is possible that traumatic lesions have diminished in incidence as the cesarean operation is at the present time being used more frequently in preference to more complicated obstetrical procedures.

It is generally agreed that puerperalism is the chief cause of incontinence. In the first place pregnancy gives rise to hyperplasia and hypertrophy of the tissues with resulting increased mobility of all the organs of the lesser pelvis and in particular of the anterior vaginal wall. It is especially labor, whether spontaneous or forced, which causes a distention and considerable dislocation of the vaginal wall, as well as lacerations and lacerations of the pelvic support. In the post partum period incomplete involution of the organs including the vaginal walls with subsequent prolapse and retroversion plays a part. The incontinence may become manifest immediately after labor or even as late as the postmenopausal period. It may develop after a perfectly normal labor. However, incontinence occurs also in nulliparas and in virgins in whom one may find a congenital or acquired laxity of the tissues, as well as an abnormally marked convexity of the anterior vaginal wall or a veritable prolapse without any lesions whatsoever. Obesity or emaciation may give rise to incontinence with anterior vaginal prolapse just as frequently as puerperalism. Finally incontinence may develop following gynecological operations or accidents, in which case one usually has to deal with a fistula. Incontinence is said to occur in about 15 per cent of the cases, especially in multiparas with prolapse. Danzel even goes so far as to state that less than 80 per cent of women are perfectly continent.

From a prophylactic viewpoint it might be well to emphasize the danger of forced dilatation of the urethra, although this method is not used so frequently now as formerly for removal of large calculi. In multiparas the vaginal walls may be supported by a pessary. Prolonged labor should be avoided and special precautions taken during management of the third stage. Vaginal or perineal tears should be repaired with deep not superficial sutures and clamps should not be used. Measures should be taken to hasten involution. Exercise and gymnastics with massage of the abdominal and pelvic muscles combined with oxytocic drugs will hasten involution. Constipation and prolonged retention of urine should be avoided. In cases of retarded involution and flaccidity of the tissues hot astringent vaginal douches or suppositories may be beneficial. In cases associated with retroversion a well chosen Hodge pessary may give relief, pessaries have a palliative effect also after incontinence has been established.

Various procedures have been described for the surgical treatment of urinary incontinence. The simplest and most generally used method is anterior colporrhaphy, the purpose of which is to diminish the distended surface to relax the anterior vaginal wall and to suppress the exaggerated convexity and the cystocele so often present. However, it diminishes the vaginal surface only in its transverse diameter and for this reason Muret in 1913 suggested a T suture which diminished the vaginal surface both transversely and longitudinally. Colporrhaphy supplemented with colpoperineorrhaphy will often suffice to cure slight incontinence but usually some type of reinforcement is required. The author briefly describes the purse string suture at the base of the bladder and the procedures of various other investigators especially that of Goebel, Fraenkel, Stoeckel, which is known as pyramidoplasty. It is indicated in complicated cases with severe lesions of the urethra and extensive cicatricial adhesions between the bladder and pelvis. In these cases direct myoplasty will not suffice. Many surgeons consider this operation the method of choice for the treatment of incontinence. According to Mikulicz Radetzki it will yield favorable results in 86 per cent of the cases. The operation is quite tedious and difficult, however, with difficult hemostasis. In an effort to simplify the intervention several modifications have been suggested by Miller and Bonafant. Schoenholzer has recommended a Kocher colporrhaphy as a supplementary procedure to the Goebel-Stoeckel procedure. As a rule anterior colporrhaphy suffices and the other more complicated procedures should be reserved for cases with extensive adhesions, severe organic lesions and recurrences.

EDITH SCHWENK MOORE

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Keller, R., and Schmitt, L.: Considerations on Malformations of the Uterus, Together with Case Reports on Pregnancy and Labor (Quelques considérations concernant les malformations utérines en rapport avec la grossesse et l'accouchement) *Rev franç de gynéc et d'obst*, 1937, 32 620

The authors report a case of cloistered bicornuate, uncervical uterus discovered during operation for a cystic pelvic mass. The mass proved to be a hematometra of the right cornu of the uterus, which could not be completely resected because of complicating adhesions. The postoperative course was stormy, but recovery was complete. Three years later the patient returned with an advanced pregnancy, and at term was delivered of a normal infant in breech presentation.

In a review of 30,000 deliveries in the past fifteen years at the "Maternité" of the City Hospital of Strasbourg, 15 malformations of the uterus, all of which were diagnosed as uterus bicornis unicollis or some minor variation of this deformity, were discovered. Among the 15 cases there were 41 pregnancies, 21 of which went to term, 7 premature deliveries, 13 abortions, 22 living children, and 6 dead infants. These figures were found to be in accord with those of many of the authors who have reported on this subject.

GEORGE C. FINOLA, M.D.

Philipp, E.: Pyelitis and Pylonephritis in Pregnancy (Pyelitis und Pylonephritis in der Schwangerschaft) *Zentralbl f Gynaek*, 1937, p 1820

The experience with a large series of patients and several appended case histories are presented in this article. They justify new and sweeping statements concerning the much discussed pyelitis and pyelonephritis in pregnancy.

In a general manner the author presents his views concerning the cause and pathogenesis of pyelitis of pregnancy. In the majority of cases the process is a descending one, clinical and anamnestic evidence indicates that the process has its origin in the kidney pelvis which has been infected by the hematogenous route. The causes are the atonic state of the intestines, renal pelvis, and ureter. The fact that the right kidney is more frequently affected is due to the mechanical pressure of the dextrorotated uterus. The dilatation of the renal pelvis and ureter is caused by the placental hormone. This dilatation can be brought about in non-gravid as well as senile women by transfusions of blood from pregnant donors, such transfusions were made by the author, but for other reasons. A high meat and low vegetable diet, which is common in Pomerania, is a definite factor in pyelitis. This factor plays a large rôle as is shown by the high incidence of pyelitis in the Greifswald clinic (3 per cent of all obstetrical admissions).

The symptoms of pyelitis gravidarum are concerned largely with the involvement of the kidney substance by the infection, which in such instances becomes grave. It was not always easy to determine the danger zone. The following factors indicate a dangerous turn of events: high fever and numerous chills, oliguria, increasing non-protein nitrogen, the appearance of hemoglobin, and tyrosine and leucine crystals in the urine, and the combination of pyelitis and general toxicosis, which is always secondary. Hematuria is, in itself, no serious symptom. It is noted, as shown in certain instances, even in mild cases of pyelitis. In all severe cases, with steady increase of the grave symptoms and the obvious development of toxicosis, interruption of pregnancy is indicated. This, however, is the only time when therapeutic abortion is indicated. These exceptions do not invalidate Stoeckel's thesis that interruption of pregnancy is never necessary in pyelitis of pregnancy.

(G. SCHAEFFER) HAROLD C. MACK, M.D.

Traut, H. F.: Pyelo-Ureteritis in Pregnancy. *Am J Obst & Gynec*, 1937, 34 392

Three factors are of paramount importance in the production of pyelo-ureteritis in pregnancy. These are stasis, trauma, and infection. It is noteworthy and probably very significant that over 95 per cent of the cases of pyelitis of pregnancy are caused by organisms belonging to the colon group of bacilli. The fact that the bacillus coli is the chief pathogenic invader suggests very strongly that this organism comes to the urinary tract from the bowel and that it does this either by direct ascent of the lumen of the tract or by being transported there by way of the lymphatic system.

Pyelo-ureteritis occurs as frequently in multiparas as in primigravidas. The onset of the initial attack is usually in the last trimester of pregnancy, or in the early puerperium. The first symptom may be hematuria, although this is by no means constant. The acute phase is usually accompanied by a marked elevation of the temperature, hectic in type, and associated with chills.

The palliative treatment consists of rest in bed, with frequent change of position which shifts the weight of the uterus from side to side so that the ureters can be emptied more readily and drainage of the tract be improved. Fluids are forced, a bland diet is prescribed, and a mild saline purge is administered every other day. Immediately upon admission, three laboratory procedures are carried out: (1) a catheterized bladder specimen is secured for examination and culture, (2) the blood is examined to discover whether or not there is nitrogen retention, and (3) an intravenous x-ray pyelogram is made to furnish information as to the degree of damage already caused by the inflammatory process.

and to serve as a rough test of kidney function. If the organism is a colon bacillus, if there is no non-protein nitrogen retention and if the process is unilateral, the patient is given the palliative treatment for as long as seven days.

If on the other hand, the patient does not respond to this conservative treatment after six or seven days of palliative therapy, the affected ureter is catheterized with a No. 7 or No. 9 catheter which is left in place with the tip high in the tract to provide drainage. The catheter is left in position not more than three or four days, when it is removed whether or not the temperature and other symptoms have subsided. While the catheter is in position lavage of the kidney pelvis with normal saline solution is carried out at four hour intervals.

When the infection is bilateral, one is not justified in giving palliative therapy for so long a period particularly if the patient is two or three months from term. If, in addition to a well established bilateral infection, one discovers non-protein nitrogen retention, the termination of pregnancy should be mandatory. The danger of a fatal outcome for the mother is such a great possibility that delay should not be tolerated.

Post partum treatment is necessary until repeatedly negative urine cultures are obtained.

EDWARD L. COANELL, M.D.

Eastman N. J. Heart Disease in Pregnancy. The Respective Duties of Internist and Obstetrician. *Med. Clin. North Am.*, 1937, 21, 1407.

Cases of heart disease in pregnancy are best handled by the obstetrician and cardiologist in close cooperation.

The first fact which the obstetrician will want to know is whether the woman has rheumatic heart disease. Apparent cardiac enlargement, systolic murmurs, accentuation of the pulmonary second sound, shortness of breath on exertion and even crepitant rales at the base of the lungs may be present at times in pregnant women who have perfectly normal hearts.

The two alterations in the heart during pregnancy which most frequently simulate disease are the change in cardiac outline and the occurrence of murmurs. The former is due in part to mechanical factors, namely the growing uterus and elevated diaphragm and in part to an actual increase in the total area of the cardiac outline. Thus the positional relationships of the heart to the thoracic cavity are frequently changed. Murmurs occur in from 10 to 20 per cent of gravid women as the other common alteration in pregnancy which may suggest heart disease. They are to be most logically associated with upward pressure of the enlarging uterus upon the diaphragm and in turn upon the heart. It is quite important to examine heart murmurs during pregnancy with the patient in the standing as well as in the recumbent position. As a general rule diastolic murmurs are not physiological but are evidence of rheumatic heart disease.

The second help which the obstetrician will expect from the cardiologist is in prognosis. Pregnancy is associated with a substantial increase in cardiac output on the average 50 per cent more work than in the pre-gravid state. There is a greater amount of tissue to be supplied with blood, and more blood must be pumped in the circulatory system adjustments which would naturally demand an increase in the output of the heart per minute. It is necessary that the functional capacity of the heart be evaluated from as many points of view as possible with consideration of the behavior of the heart in previous pregnancies and labors.

The manner in which the obstetrician carries out this task will of course vary greatly according to the needs of the particular case. Keeping in mind the classification of the New York Heart Association, patients grouped in Class 1 and Class 2a may with rare exceptions be allowed to go through pregnancy and the first stage of labor if the second stage promises to be short. Spontaneous delivery may be permitted but if it threatens to be long delivery by forceps is usually desirable. Adequate rest during the whole prenatal period, avoidance of upper respiratory infections, recognition of early signs of heart failure and care during labor are the chief considerations for the successful handling of these patients.

For Class 2b patients delivery by the natural passages may be permissible if there has been no history of heart failure and if they are multiparas. In the majority of this group cesarean section will be the procedure of choice. If decompensation has occurred during the present pregnancy the operation should be done under local infiltration anesthesia. If no recent heart failure has occurred the non-inhalation anesthetics are still to be preferred but open ether is permissible. The operation should be performed with the head and shoulders slightly elevated. Under no circumstances should a patient with heart disease be submitted to the Trendelenburg position. At the close of the operation the patient should be sterilized.

The treatment of patients in Class 3 resolves itself essentially into the treatment of heart failure in pregnancy, labor and the puerperium. A cardinal fact is that in the presence of heart failure delivery by any known method carries with it a maternal mortality of over 50 per cent. Decompenation having been allied, cesarean section under local infiltration anesthesia is the method of choice for delivery.

CHARLES BARON, M.D.

Danforth W. G. Carcinoma of the Cervix During Pregnancy. *Am. J. Obst. & Gynec.* 1937, 34, 373.

The frequency of carcinoma in pregnancy as estimated from several reports and including the author's own work is 0.0321. The pregnancy is unfavorably influenced. Abortions are frequent and placenta previa is more common than in normal pregnancy. Labor may be very dangerous and is sometimes impossible.

The result of treatment is far better during the first six months than in the last three. Today

irradiation, both with radium and deep x-rays, is the most effective treatment. This should be done at once unless the pregnancy is so far advanced that it is desired to allow the child to attain viability. If full radiotherapy is used, it is better to terminate the pregnancy because of the risk of serious developmental harm to the infant. A moderate radium dosage may be used to check the growth of the tumor in order that the child may attain viability with less likelihood of harm. Incision or dilatation of the carcinomatous cervix is very dangerous. If labor is not possible, cesarean section should be done as an elective measure. This should be followed by a Ries-Wertheim radical hysterectomy or subtotal hysterectomy with irradiation of the carcinomatous stump. The latter is favored.

EDWARD L. CORNELL, M D

Cosgrove, S A : Surgical Complications of Pregnancy. *Am J Obst & Gynec*, 1937, 34 469

The diseases which may occur concomitantly with pregnancy should, in general, be thought of and managed just as though the pregnancy did not exist, and the pregnancy itself should not be interfered with because of the simultaneous occurrence of such diseases.

The author reports 23 acute conditions occurring in 25,000 pregnancies in which abdominal surgery was necessary. There were 19 cases of acute appendicitis in which all the women were delivered *per vaginam*. One woman died, but she was admitted after two days of purgation. Two cases of twisted ovarian cysts, 1 case of degenerated uterine fibroid, and 1 case of adenocarcinoma of the ovary were operated upon. All were delivered *per vaginam*. One patient with acute hemorrhagic pancreatitis died following operation. She also was delivered *per vaginam*.

Acute appendicitis is a surgical condition invariably calling for prompt operative intervention. This indication is not modified, but is even more important when appendicitis complicates pregnancy, even at or near its termination.

Its surgical treatment should not be combined with any manipulation to terminate pregnancy. The only exceptions to this statement are the legitimacy of simple procedure to expedite termination of the second stage of spontaneous labor, and recognition of the very rare possibility of concurrent serious factors of obstetrical dystocia. When the latter are present, delivery by the abdominal route may be necessary. However, such interference should be reserved until after the onset of spontaneous labor, and an extra-peritoneal approach should be selected.

The same principle applies in other surgical complications of pregnancy. EDWARD L. CORNELL, M D

Molnár, M.: Surgical Complications following Covered Perforations of the Uterus (Über chirurgische Komplikationen nach gedeckten Utersperforationen). *Zentralbl f Chir*, 1937, p 1270

For the treatment of fresh perforations of the pregnant uterus two methods are available in asep-

tic cases in which other injuries can be excluded conservative therapy is indicated, otherwise immediate laparotomy should follow. It is much more difficult to decide upon operative interference if considerable time has elapsed since the perforation. To prove how easy it is to make diagnostic errors in such cases the author reports 2 cases.

In the first case, that of a thirty-three-year-old woman who had attempted an abortion on herself, a curettage was done the next day, and the perforation made at this time was not recognized by the attending physician. For five days the site of perforation was covered with a loop of small bowel and then a stormy peritonitis developed from the late secondary giving-way of this adhesion. Five days elapsed from the time of perforation and, on account of the statements of the attending physician, the life-saving operation was delayed.

The second case was that of a woman forty-four-years-old, a para-II, who after an amenorrhea of six weeks' duration took quinine powder to induce abortion, and during the cleaning out of the uterus the latter was perforated with a forceps and a loop of small bowel was injured. For three days the site of perforation was covered with the injured loop of bowel so that no peritonitis occurred. Gradually, however, an ileus developed and the patient was brought to the hospital. In the sounding of the uterus the loop of small bowel was loosened and at the laparotomy which followed immediately the injury of the small bowel was repaired and a supra-vaginal amputation of the uterus was done.

In both cases the injury of the uterus was covered over by an adhesion of a loop of small intestine. In late cases like the first one the time elapsed should not mislead one to delay the operation. Careful analysis of the history should lead to the correct diagnosis and treatment in such cases. In all cases of ileus following abortion the relationship between the curettage and the ileus should be considered and treated accordingly.

In conclusion, the author, who is a surgeon, emphasizes the well known rule that the instrumental evacuation of the gravid uterus is a serious procedure and ought to be done only by specialists. Unfortunately, this rule is not always followed.

(ROSSENBECK) LEO A. JUHNKE, M D

LABOR AND ITS COMPLICATIONS

Lovset, J. Atypical Forceps and Presentation of a New Forceps Model (A propos du forceps atypique et présentation d'un nouveau modèle de forceps). *Acta obst et gynec Scand*, 1937, 17 373

The author describes in a brief résumé the more important modifications of obstetrical forceps since the time of Chamberlen. He emphasizes particularly the alterations designed to permit high applications upon the unrotated head and correct traction at the various levels of the birth canal.

For situations requiring delivery of the unrotated or partially rotated head the author has constructed

and to serve as a rough test of kidney function. If the organism is a colon bacillus, if there is no non-protein nitrogen retention and if the process is unilateral, the patient is given the palliative treatment for as long as seven days.

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The second help which the obstetrician will expect from the cardiologist is in prognosis. Pregnancy is associated with a substantial increase in cardiac output, on the average 50 per cent more work than in the pre-gravid state. There is a greater amount of tissue to be supplied with blood, and more blood must be pumped in the circulatory system adjustments which would naturally demand an increase in the output of the heart per minute. It is necessary that the functional capacity of the heart be evaluated from as many points of view as possible with consideration of the behavior of the heart in previous pregnancies and labors.

The manner in which the obstetrician carries out this task will of course vary greatly according to the needs of the particular case. Keeping in mind the classification of the New York Heart Association, patients grouped in Class 1 and Class 2a may, with rare exceptions, be allowed to go through pregnancy and the first stage of labor. If the second stage promises to be short, spontaneous delivery may be permitted, but if it threatens to be long, delivery by forceps is usually desirable. Adequate rest during the whole prenatal period, avoidance of upper respiratory infections, recognition of early signs of heart failure, and care during labor are the chief considerations for the successful handling of these patients.

For Class 2b patients, delivery by the natural passages may be permissible if there has been no history of heart failure and if they are multiparas. In the majority of this group, cesarean section will be the procedure of choice. If decompensation has occurred during the present pregnancy, the operation should be done under local infiltration anesthesia. If no recent heart failure has occurred, the non-inhalation anesthetics are still to be preferred, but open ether is permissible. The operation should be performed with the head and shoulders slightly elevated. Under no circumstances should a patient with heart disease be submitted to the Trendelenburg position. At the close of the operation, the patient should be sterilized.

The treatment of patients in Class 3 revolves itself essentially into the treatment of heart failure in pregnancy, labor and the puerperium. A cardinal fact is that in the presence of heart failure, delivery by any known method carries with it a maternal mortality of over 50 per cent. Decompression having been allayed, cesarean section under local infiltration anesthesia is the method of choice for delivery.

CHARLES BAROV, M.D.

Danforth W. C. Carcinoma of the Cervix During Pregnancy. *Am. J. Obst. & Gynec.* 1937, 34, 365.

The frequency of carcinoma in pregnancy is estimated from several reports and including the author's own work is 0.0321. The pregnancy is unfavorably influenced. Abortions are frequent and placenta previa is more common than in normal pregnancy. Labor may be very dangerous and is sometimes impossible.

The result of treatment is far better during the first six months than in the last three. Today

was also striking that there was an absence of mixed infection of the placentas among the controls and that aerobic infections were extremely rare

The important factor in the development of placental infection after induction of labor is the length of time elapsing between the insertion of the rectal tube and the delivery of the child. The average post-induction interval for the 28 infected cases was sixty-three hours, whereas for the 18 cases in which the placenta was sterile the postinduction interval was thirty-one hours. Neither the condition of the mother nor the stage of the pregnancy appeared to be a factor in the development of an infection.

Infections of the placenta following tubal induction of labor were associated with increased risk to the life of the child. Mixed infections were more serious than infections with a single organism, and the presence of organisms in the blood of the larger fetal vessels of the placenta was associated with a strikingly high infant death rate. In 5 infants who died shortly after birth, the same types of organisms were cultured from the fetal tissues and from the placentas. This suggests that the bacteria detected in the fetus were derived from the placenta, or from the same source as that from which the placenta was infected. Furthermore, the presence of bacteria (especially bacillus coli and aerobic streptococci) in the blood of the large fetal vessels of the placenta usually indicated a similar infection of the fetus, in some cases at least this infection was probably responsible for fetal death.

In 3 cases a sample of liquor amni was obtained at the time the rectal tube was inserted, in each instance the fluid was sterile. In 2 cases the liquor was obtained some time after the induction, in both of them it was infected.

The tendency among obstetricians to discount placental infections and to look on them as contaminations is not supported by the author's findings. Twenty-two of the 46 cases of induced labor ran a febrile course during the puerperium. In 19 of these 22 there was infection of the placenta. Consequently, the authors believe that there is a definite relationship between fever in the mother and infection of the placenta, but there is a much less significant correlation between a febrile reaction in the mother and infection in the fetal placental vessels.

GEORGE H. GARDNER, M.D.

MISCELLANEOUS

Weymeersch, A., and Snoeck, J.. The Treatment of Uteroplacental Apoplexy (*Traitement de l'apoplexie utero-placentaire*). *Gynéc et obst.*, 1937, 36 156

In attempting to evaluate the various forms of treatment recommended for uteroplacental apoplexy, such as conservative cesarean section, cesarean section followed by hysterectomy, and hysterectomy *en bloc*, the authors take the clinical diagnosis rather than the anatomical diagnosis as a basis. Between simple retroplacental hemorrhage with its relatively

discreet clinical picture and the major form of acute uteroplacental apoplexy, there exists a series of intermediary stages, the clinical aspects of which are very similar, and in which there is not always a direct relation between the severity of the symptoms presented and the appearance or extent of the characteristic lesions of uteroplacental apoplexy. To avoid erroneous conclusions the authors have excluded from their material all cases of spontaneous delivery in which the diagnosis of premature separation could be made only retrospectively even though the patient exhibited slight signs of pregnancy toxemia. The material included answers to a questionnaire sent out by the authors and cases reported in the literature.

The treatment of retroplacental hemorrhage has followed the general evolution of obstetrical therapeutic methods in the past fifty years. Two periods may be distinguished. Before the work of Couvelaire in 1911 cesarean section was rarely done for premature separation of the placenta with hemorrhage. From that time on, however, the abdominal method began to take its place side by side with the old obstetrical methods, which gave very poor results in many cases.

The authors are convinced that in a large number of partially toxic placental detachments, the characteristic organic lesions of uteroplacental apoplexy may be present so that it is difficult to estimate the frequency of this type of retroplacental hemorrhage.

The cause of toxic retroplacental hemorrhage is not known. Prophylactic measures are still symptomatic, if not empirical. However, as the condition is most frequently associated with or preceded by albuminuria, hypertension, and edema, it seems logical to combat these symptoms as early as possible. In general, the prophylaxis of retroplacental hemorrhage corresponds to that of eclampsia. Albuminuria is not so constant a finding in the hours or days preceding retroplacental hemorrhage as preceding eclampsia. The demonstration of a relative hypertension may have greater significance in prophylaxis than a single manifestation of a more severe degree at the end of pregnancy. Water retention or the so-called "hidden edemas" may be detected by regular weighing. There is usually an abnormal increase in weight preceding attacks of hypertension or albuminuria. Premature separation of the placenta occurs almost twice as often in patients with pregnancy toxemia as in patients with simple edema. Portes reports the coexistence of pregnancy toxemia and uteroplacental apoplexy in 91.3 per cent of the cases.

After giving a brief résumé of the opinions of several authorities in regard to the most suitable treatment for uteroplacental apoplexy, the writers compare the mortality statistics of the various methods of treatment. Maternal mortality from the obstetrical methods averaged 65.8 per cent, and from the surgical methods, 21 per cent. Fetal mortality from the obstetrical methods averaged 61.63 per cent, and from the surgical methods 70.70 per cent.

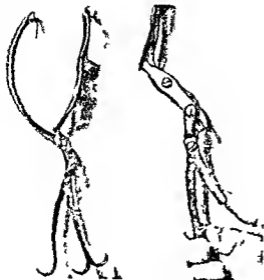


Fig 1

Fig 2

a new model resembling somewhat that devised by Sandberg and Vedeler. It differs from the latter in the construction of hinges upon the anterior blade lock and handle. The purpose of the hinge is to permit direct application of the anterior blade without the necessity of turning or wandering (Figure 1).

The hinge is fixed by a triple steel spring 0.3 mm in thickness. The spring is loosened or tightened by two interlocking levers. When the anterior blade has been applied to the fetal head the lever above the handle and outside of the vulva is pressed downward thereby fixing the hinge and conforming the blade to the fetal skull (Figure 2). A small rivet on the neck of the anterior blade forms the lock. The rivet head fits into a small slit on the neck of the posterior blade when the blades are in proper position (Figure 3). The construction and shape of the handles is shown in the illustrations.

To date this instrument has been used 97 times both in Norway and in Berlin at Stoeckel's Clinic. Application of the blade has caused no difficulties nor have any important maternal or fetal injuries been noted. The posterior blade is introduced first. This is never difficult to accomplish because of its extreme semicircular curvature. The introduction and fixation of the anterior blade follows.

The author lists the following advantages for his new model:

1. Exact biparietal application is always possible in either oblique or transverse presentation of the head.
2. The forceps cannot slip outside of the os during its introduction. The elastic spring keeps the blade close to the fetal head. The semicircular shape of the posterior blade aids it in conforming to the contour of the fetal skull.



Fig 3

3. Intracranial injuries are lessened because proper application is maintained throughout the extraction.

4. The curve of the forceps maintains proper direction of traction in all parts of the birth canal and minimizes the force required to effect delivery.

5. The construction of the lock which permits proper approximation of the blades and a secure biparietal grip prevents slipping of the blades.

The author adds a final warning that exact diagnosis of position, as determined by palpation of the sutures and fontanelles is a necessary prerequisite to the use of this as well as all other varieties of forceps particularly in atypical applications.

HAROLD C. MARK, M.D.

Pentfold W. J. and Butler H. M. Placental Infection in Induced Labor with Special Reference to Fetal and Neonatal Mortality. *Med J Australia* 1933 2: 123.

The data for this paper were obtained from the bacteriologic examinations of 114 placentas and 12 infants. 46 placentas were derived from patients in whom labor had been induced with a rectal tube, but in the remainder labor had not been induced. Cultures were made from the blood in large vessels on the fetal side of the placenta and from tissue on the maternal side. If the child was stillborn or if it had died within ten days cultures were made from its heart's blood, spleen, lung and occasionally from the liver.

Placental infection was detected two and one half times more often following surgical induction of labor. Twenty-eight of the 46 placentas from patients in whom labor had been induced were infected. Among the 68 controls only 16 yielded a growth and in no instance were the organisms of a characteristic fetal type. Further more in the control group infection of the placental vessels was never detected but 14 of the induced cases yielded positive cultures. It

GENITO-URINARY SURGERY

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The limits of growth of adrenal adenoma are restricted. In pure form they do not reach large dimensions or produce metastases, and most of them are encountered at autopsy. Malignant transformation into adenocarcinoma, or a still more atypical growth, is relatively common.

From a review of the literature, it is believed that the occurrence of an adenoma of the adrenal gland associated with an extensive Grawitz tumor of the kidney is probably rare. In the cases herein reported, there was no evidence of pseudohermaphroditism.

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the right side there was some resistance to the catheter, but after manipulation the catheter was passed in its entirety. Clear urine was obtained from both sides.

The plain film showed irregular calcification in the region of the right kidney. The left pyelogram was normal. The right pyelogram showed downward displacement of the renal pelvis and calyces. There was a sponge-like area of calcification lateral to the tip of the superior major calyx. The middle and inferior calyces pointed downward and the superior calyx pointed mesially. The upper portion of the ureter overlapped the spine.

Nephrectomy was performed in the usual manner. After severance of the pedicle, tumor tissue could be seen extending into the renal vein as far as it could be palpated. The patient was in severe shock following the operation, and died nine days later from uremia. The pathological diagnosis was adenoma of the adrenal gland, Grawitz tumor of the kidney with degenerative changes and areas of hemorrhage, scarring and calcification; invasion of the blood vessels and wall of the ureter, chronic and subacute pyelitis.

The second case was that of a white woman, aged sixty-two. In the course of routine examination, a mass was discovered in the upper left quadrant. There were no urinary disturbances, although the urine contained a moderate number of red blood cells and pus.

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C TRAVERS STEPITA, M D

In their study of the obstetrical methods of treatment of uteroplacental apoplexy, the authors divide their material into cases with spontaneous delivery in spite of various procedures such as artificial rupture of the membranes, incision of the cervix manual or instrumental dilatation, and cases with rapid artificial delivery of the fetus through an insufficiently dilated cervix.

The highest mortality rate 22.5 per cent was observed in cases treated by vaginal cesarean section followed by version. Cases treated by forceps and by breech extraction had mortality rates of 14.3 and 14.7 per cent respectively. The general maternal mortality rate following obstetrical procedures with spontaneous deliveries was 12.5 per cent and following forced delivery 55 per cent after surgical procedures the mortality rate ranged from 41.1 to 54.8 per cent and depended upon the operation used. Treatment by the expectant method as described by Solomons had a maternal mortality rate of only 3.73 per cent. Stroink, who also favors expectant treatment reported a maternal mortality rate of 11.5 per cent from surgical procedures and only 5 per cent from expectant treatment with a fetal mortality of 65 per cent for the former and 78 per cent for the latter method. Both de Snoo and Stroink were formerly advocates of prompt surgical intervention in cases of uteroplacental apoplexy.

The incidence of secondary hemorrhage due to uterine atony is in direct proportion to the incidence of obstetrical intervention.

The surgical procedures used for the treatment of uteroplacental hemorrhage include conservative cesarean section, cesarean section followed by hysterectomy and abdominal hysterectomy *en bloc*. The extent of the lesions cannot be taken as a guide in the selection of the operative procedure. The mortality rate in cases in which the uterus was emptied within ten hours of onset was 27 per cent as compared to 40 per cent in cases in which it was emptied after ten hours. However in the latter the mortality rate from obstetrical methods was only 30 per cent as

compared to 50 per cent from surgical methods which would seem to contradict the theory that secondary hysterectomy or hysterectomy *en bloc* will ameliorate maternal prognosis by suppressing the focus of intoxication. Many writers perform hysterectomy only in cases in which the intravenous injection of posterior pituitary extract fails to produce a uterine reaction. The present writers used orastrin the oxytocic fraction of the posterior pituitary body for this test. Also the routine administration of ergometrine as suggested by Dale constitutes an advance from this point of view.

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It was found that the operation presenting the lowest mortality rate was low cesarean section without exteriorization of the uterus. Operation during the height of hemorrhagic symptoms at the time of peritoneal shock should be avoided. Before operation is performed the patient should be thoroughly warmed. Injections of physiological serum and cardiotonics should be given and blood transfusions performed if necessary. The routine use of posterior pituitary extract administered intravenously or ergometrine should reduce the indications for hemostatic hysterectomy. Hysterectomy *en bloc* has been abandoned as it failed to yield the expected results. The only two methods of anesthesia permissible are ether and local anesthesia. Fetal mortality must always be a secondary consideration. The authors who were formerly convinced of the value of prompt surgical intervention are beginning to believe that the expectant treatment is to be preferred.

LOUISE SCHANCHE MOORE

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EDITH SCHWARTZ MOORE

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C. TRAVERS STEPITA, M D

Akerlund A. The Technique of Roentgen Examination of the Exposed Kidney (Ueber die Technik bei Roentgenuntersuchung der freigelegten Niere) *Acta chirurg Scand* 1937, 79: 53

The author recommends special flexible film packs resembling dental films for roentgen examination of the exposed kidney. Each pack contains two films, size 7 by 13 cm. with rounded corners, and a thin tinfoil covering on the back. In order to preserve sterility a relatively long sterilizable charging case of non rust steel is used and over this a sterile rubber glove is drawn up in its palmar surface. The film pack is introduced through the charging case. The entire package is then tied crosswise by a linen band, and obliquely on the reverse side with the fingers and wrist part of the glove folded in (Figure 1).

During the exposure the film pack must be applied to the kidney by bending and fastened with two rubber bands placed crosswise (Figure 2). It may also be applied with gauze packing. In many cases an anteroposterior exposure suffices, but profile exposures show whether a stone lies in the anterior or posterior half. In the upper left hand corner of



Fig. 1. The film pack introduced in the rubber glove ready for use, front and back views.

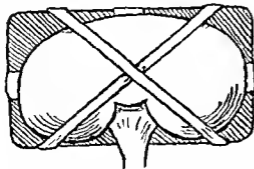


Fig. 2. The film pack fixed by means of two rubber bands placed crosswise.

each film pack a paper clip is fastened to the two poles and the anterior and posterior halves of the kidney. Louis Newmark, M.D.

Mathé C. P. Renal Tuberculosis in Children (La tuberculose rénale de l'enfant) *Arch. d'ind. et de méd. des organes génito-urinaires* 1936, 10: 517

Mathé reports that in 4,698 cases of unilateral renal tuberculosis collected from the literature there were 563 cases in children and adolescents from one to twenty years of age, 12 per cent. These included 20 cases, 0.42 per cent in children from one to five years of age, 51 cases, 1.08 per cent in children from five to ten years of age, and 492 cases, 10.5 per cent, in older children and adolescents from ten to twenty years of age.

Six cases in patients from eight to eighteen years of age operated upon by the author are reported. The author notes that in younger children below the age of five years there is a tendency to rapid generalization of the tuberculosis and unilateral renal tuberculosis is of rare occurrence. Above the age of five years unilateral renal lesions are found more frequently and are more easily diagnosed. Bilateral renal tuberculosis is not a surgical condition; the parenchyma of the kidneys is usually extensively involved and the symptoms are those of nephritis; the urine is clear but contains tubercle bacilli.

Unilateral renal tuberculosis is of three types: (1) pyonephrosis with the ureter closed; (2) pyonephrosis with perinephritis or perinephritic abscess; and (3) the form with caseous lesions and cavity formation and a permeable ureter. If the diseased kidney is not removed the opposite kidney may become infected. If stricture of the ureter results in its complete occlusion the tubercle bacilli may disappear from the urine and symptoms may subside, but this does not indicate healing of the tuberculosis; the kidney may become completely calcified but this rarely occurs.

In children with a chronic cystitis, pyuria and pyelitis that are resistant to treatment renal tuberculosis should be suspected. If the urine in such cases is acid and turbid or opalescent but does not contain the organisms usually found in pyelonephritis a special search should be made for the tubercle bacillus. The cystitis is accompanied by frequent micturition, recurrent hematuria and nocturia. There may be pain in the lumbar region and renal colic due to stricture of the ureter and the kidney may be palpably enlarged. Clinical symptoms of tuberculosis may develop, such as fever, night sweats and loss of weight. These children may show evidence of tuberculosis elsewhere, in the lungs, glands, bones or joints. Such lesions may be active, quiescent or healed. In order to demonstrate the presence of tubercle bacilli in the urine repeated examinations must be made if the organisms found are not definitely identified by staining methods, guinea pig inoculation may be necessary. A complete urological examination

should be made in children who show a pyuria that persists for more than four weeks in spite of treatment. With modern cystoscopes of small caliber, such a urological examination can be made even in young children. The appearance of the bladder in children with renal tuberculosis is similar to that in adults. The function of the affected kidney is usually definitely reduced as shown by renal function tests. Pyelography often shows deformity of the pelvis with the characteristic worm-eaten appearance, the calices sometimes are irregularly dilated. In cases in which cystoscopy is difficult or impossible, intravenous urography is often of aid in establishing the diagnosis.

The treatment of unilateral renal tuberculosis in children is the same as in adults, i.e., nephrectomy in an early stage. While most surgeons report cures in over 50 per cent of the adults following nephrectomy for unilateral renal tuberculosis, Falcì reports cures in only 24 per cent of the children. While the author cannot report a large series of cases of unilateral renal tuberculosis in children, of his 6 patients upon whom nephrectomy was done, 4 are in excellent health, 2 without any symptoms for ten years, 1 for four years, and 1 for three years after operation. These results indicate that the cures in children after nephrectomy average considerably more than 24 per cent. In 2 of the author's cases nephrectomy was apparently done after the disease had become generalized. In children there is undoubtedly a greater tendency to early generalization of tuberculosis after nephrectomy than in adults. In addition to nephrectomy at an early stage, the treatment should include heliotherapy after operation and the general hygienic regimes of the modern tuberculosis sanatorium, radiotherapy is also of value, but it should not replace operation when the disease is unilateral. ALICE M. MEYERS

Lepoutre, C., and Dewailly, A.: Extra-Vesical Terminations of the Ureter in Women (Les abouchements extra-vésicaux de l'uretère chez la femme) *Arch. d. mal. d. reins et d. organes génito-urinaires*, 1936, 10, 551.

Lepoutre and Dewailly note that formerly ureteral anomalies were only anatomical curiosities discovered at autopsy, but in recent years the development of pyelography has made it possible to diagnose and study such anomalies in living persons. The diagnosis of ectopic ureter is made more frequently in females than in males. Kilbane collected 98 cases from literature, adding 2 of his own. Of these 100 cases, 65 were in women and of the 65, 58 were diagnosed during life, 35 were in men and all but 2 of these were found only at autopsy.

In perhaps a third of the cases of ectopic ureter, there is a single kidney, but in the other two-thirds the kidney is double with two ureters, one terminating normally in the bladder, the other outside of the bladder. According to Weigert the ectopic ureter corresponds to the upper kidney. If the ectopic ureter originates in a single kidney, this kidney is

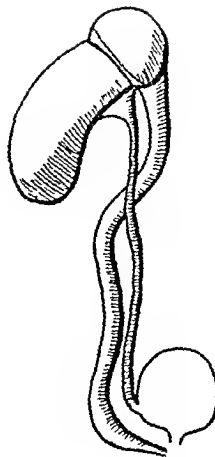


Fig. 1. The case reported is a good example of the most frequent type. The ectopic ureter corresponds to the upper kidney or double kidney. Note the atrophy of the upper kidney and the dilatation of the ureter.

always dilated and the parenchyma is atrophic. In the double kidney, the lower portion shows a normal parenchyma, the upper portion is small, consisting of a dilated renal pelvis surrounded by a thin layer of parenchyma. This atrophic kidney has practically no function. The orifice of the ectopic ureter is narrower than normal, the ureter is dilated and tortuous.

The chief symptom of an abnormal termination of the ureter is incontinence of urine, which has been present since birth, usually it is continuous, day and night, and is not affected by the position of the patient. In some instances the urinary incontinence ceases to be continuous and becomes intermittent. This may be due to loss of function of the atrophic kidney or to the dilatation of the ectopic ureter which serves as a "reservoir" for the urine. When the character of the urinary incontinence suggests an abnormal termination of the ureter outside of the bladder, careful examination of the vulva, the urethral meatus, and the vagina must be made to locate this orifice. This orifice is usually found in the urethra or in the vulva near the urethral meatus. Less frequently it is found in the vagina, and occasionally in the uterine cervix, or in the rectum. If the orifice is found, it should be catheterized, and if urine is obtained, an opaque medium should be introduced for radiographic examination. This usually shows the ureter to be more or less dilated and tortuous, terminating in a small dilatation. If the orifice is too small to admit a catheter, it may be dilated. If the abnormal ureteral orifice cannot be found, bilateral pyelography is indicated; the absence of the upper calyx on one side only indicates the probability of an ectopic ureter.

The treatment of choice is partial nephrectomy, removal of the ectopic ureter and the upper atrophic

kidney in which it originates, in cases with a double kidney. It is not necessary to remove the ectopic ureter completely but the greater portion of it should be removed. The entire pelvis and parenchyma of the atrophic kidney should be removed even though this procedure involves removal of some of the normal parenchyma. A wedge shaped incision into this normal parenchyma is made. This incision is closed with catgut or, if hemostasis seems difficult, a fragment of muscle taken from the patient may be introduced into the incision.

The authors report an illustrative case in a girl eleven years of age who had had continuous urinary incontinence all her life but the amount of urine so passed was relatively small. She also urinated normally at regular intervals. Examination showed a urethral orifice on the left side just below the urethral meatus which admitted a probe. Radiographic examination with an opaque medium introduced into this orifice showed the dilated ureter extending into the upper portion of the left lumbar fossa. At operation a double kidney was found, the upper kidney, in which the ectopic ureter originated, was atrophic with a dilated pelvis. The lower kidney was normal. Removal of the atrophic kidney resulted in complete relief of the incontinence.

ALICE M. MEYERS

BLADDER, URETHRA AND PENIS

Thomson Walker Sir J. The Treatment of the Bladder in Spinal Injuries in War. *Brit J Urol* 1937 9 277

It has long been established that destruction of the supralumbar spinal cord at any point is followed immediately by complete retention of urine and that at a variable time following the injury the lumbar center recovers its tone and involuntary reflex micturition becomes established. In the large number of cases that came under the author's care during the war the following stages were clearly defined: the stage of retention and the stage of period of reflex micturition.

The duration of the stage of retention varies in different cases, the shortest being twenty-four hours and the longest eighteen months. The average duration in 30 consecutive cases, however, was fifty-five days.

At the King George Military Hospital from May 1915 to the end of 1916 330 cases of spinal injury in which the bladder function was involved were examined, and as the author remained on the Staff of the hospital until late in 1919 the total number of cases was much greater.

The patients arrived at the hospital about fourteen to twenty-one days after injury. The stay in the hospital was about a month. Patients surviving that time were sent to other institutions.

During the period already noted 111 cases were added, over 90 per cent of which arrived with serious infections of the urinary tract. Of 330 patients 160 died from urinary infection. At the Star and Garter

home 19 of 111 patients in a later stage died of urinary infection. The estimated total death rate was 80 per cent.

How was this record brought about? The universal treatment of the bladder in such cases was by intermittent passage of the catheter and it was septic catheterization that led to the mortality already quoted. It is true that this catheter treatment was not used in some areas in France but it was almost certain that at some part of the journey from the front to the base hospital in this country the case that had started well in such areas was infected by catheter by some well meaning blunderer.

The author having discussed the failure of treatment of the bladder in spinal injuries during the war passes on to examine the various methods of treatment open for choice in the future. Some of these methods were tried in the late war but the organization was imperfect and they were not carried out consistently but were changed according to the whim of the medical officer immediately in charge.

The surgical problem was neither difficult nor complicated. During the phase of complete retention or retention with overflow the problem was whether the distended bladder should be emptied and if so how the problem of the stage of periodic reflex micturition was the method of collection of the urine and the treatment of sepsis if present.

The author discusses the following methods of treatment:

1. Non-interference. It has been a tenet of the surgical creed since any of us can remember that a bladder distended with urine from obstruction or paralysis must be emptied by the surgeon at the earliest time possible.

The author has had no experience in non-intervention in cases of paralyzed bladder from spinal injury and without more definite evidence that it has no deleterious effect on the bladder function and damage to the kidneys, he does not consider it one to recommend for universal adoption. At the same time he does think that we have made rather too much of a bogey of the distended bladder. This information should be made use of in considering the time for intervention in other methods of treatment.

2. Expression of the bladder contents by pressure and massage. As soon as possible after the injury the distended bladder is gently but firmly compressed and massaged through the abdominal wall with the object of expressing its contents and this is repeated every four to six hours.

It is difficult to obtain statistics of this method. If the statements of some writers can be accepted it was the sole method used in their hands and was simple, easy and successful and was universally adopted at the end of the war. A few cases of this type came under the author's care in the later stages but all had been spoiled by the passage of the catheter and had become cases of urinary sepsis caused by catheterization or by late cystostomy. The method is entirely unsuitable for cases in which the

ious urinary sepsis has become established. Apart from the fact that the danger of rupture of the wall is greater in an inflamed bladder, massage of a distended infected bladder undoubtedly leads to regurgitation of septic urine along the lumen of the ureter to the renal pelvis. This is certain to occur in cases of nerve paralysis and overdistention of the bladder under the hand of the masseur.

3 Intermittent catheterization. It is not necessary to discuss this method further.

4 The indwelling or tied-in catheter. A cone silk-woven catheter is passed at the earliest time possible after the injury, fastened into position, and led into a bottle. Washing of the bladder with suitable antiseptics is carried out daily. The catheter is changed twice a week. When the stage of periodic reflex micturition develops, the catheter is removed.

This method, if used as a continuous drain, has a great advantage over intermittent catheterization in that it prevents the recurring distention of the bladder and forcing of the ureter. If used with a stopper or a clip to evacuate the contents of the bladder at convenient times, it is merely a variant of intermittent catheterization with all its dangers. In continuous catheter drainage cystitis will probably develop. Urethritis is a common complication.

5 Early or prophylactic cystotomy. Early in 1917, the author published the heavy mortality statistics given in this article and recommended the entire avoidance of the catheter and the drainage of the bladder by suprapubic cystotomy before any catheter had been passed. He did not expect to avoid cystitis entirely but hoped that the cystitis could be cured without a fatal pyelonephritis. The prophylaxis was aimed at pyelonephritis, not at cystitis.

The objections to early cystotomy follow.

1. It is difficult to get a watertight drainage.

2. Cystitis is certain to develop and washing is required.

3. "Drainage of the bladder for any long period practically means the abandonment of any attempt to establish automatic function, and the bladder may be permanently damaged by the adoption of this course."

If these criticisms are reliable, it looks as if early cystotomy were condemned out of hand. But do they really carry much weight? Is it impossible for a surgeon of even moderate ability to produce a watertight suprapubic drainage? The author thinks not. There is, however, a method of cystotomy introduced by Mothersill and Clifford Morson which is even simpler, and, if slightly modified, it would be suitable for these cases. A large rubber self-retaining catheter stretched on a stilet is held ready. The skin immediately about the pubic symphysis is punctured with a scalpel and a large-sized trocar and cannula are plunged directly backwards into the bladder. The trocar is withdrawn, and the left forefinger prevents the escape of urine. The stretched self-retaining catheter is passed along the lumen of the cannula and the cannula is slipped out, while at

the same time the self-retaining catheter is released and expands so as to fit the puncture in the bladder wall. The catheter is gently withdrawn until the mushroom end impinges on the inner opening of the puncture wound. A stitch may be passed through the skin to steady the catheter if the patient is to be moved. For dressing, a small piece of gauze held by strapping is all that is required. The catheter leads to a urine bottle, and is changed in a week or ten days by stretching it on the stilet and another is introduced. Washing will keep the bladder clean, but if there is difficulty about this it may be postponed until the base hospital is reached, where it can be carried out under surgical conditions. Care in keeping the end of the catheter or extension tube protected and in the urine bottle is an obvious necessity. Reference has already been made to the fact that cystitis without intravesical pressure is not dangerous.

There was never any difficulty in closing the suprapubic fistula if it was desirable. If closure did not take place on the removal of the drain and the institution of constant urethral catheter drainage, this was because of a mass of scar tissue fixing the bladder to the pubic symphysis and the abdominal wall. This fibrous mass was removed by operation, the bladder being completely freed and dropped into the pelvis. Drainage of the mobilized bladder was either suprapubic or urethral for the usual time after cystotomy, then the drains were removed.

Complication of pyonephrosis necessitated nephrectomy in some cases.

A large proportion of the patients, whether with closed bladder and periodic micturition, or with a watertight suprapubic drain, were able to get about in wheel chairs, and their general condition was greatly improved. There were urinary risks from cold and fatigue in these excursions, and attacks of pyelonephritis occasionally resulted, but there was far more gain than loss in the movement and freedom of these patients.

ELMER HESS, M D

Zelicovico, Z. Cystalgia Due to Extracystic Causes in Older Women (Les cystalgies de cause extravésicale chez les femmes âgées) *J d'urolog méd et chir*, 1937, 44 140

The author presents a rather extensive review of his experiences in the diagnosis and treatment of vesical irritability or cystalgia, occurring in women between the ages of forty-five and sixty. While the causes of a true cystitis are adequately referred to, the difficult problem lies in those cases in which no definite etiological factors can be demonstrated.

Genital lesions such as Bartholin'sitis, metritis, salpingitis, cervicitis, and prolapses are present in many women and cause vesical symptoms. In the presence of these genital lesions and leucorrheal discharges the vesical symptoms cannot be eradicated. The group of urethral lesions are carefully discussed and believed to be secondary to the genital infections, especially in those women who neglect their hygiene in the menopause. The characteristic

symptoms of a false cystitis are intermittent frequency, urgency of urination and dysuria. Later symptoms of persistent neuralgia radiating to the level of the coccyx, anus, vulva, and urinary meatus are noted. The bladder mucosa and tolerance are normal. No residual urine is found. General symptoms of nervousness, emotional instability and loss of weight may be present. In searching for a diagnosis a careful gynecological examination should be made, including examination of the Bartholin glands. The urethral lesions to be looked for are infected Skene's ducts, polyps, prolapse and tumors of the meatus, chronic urethritis with polyps or contraction, urethroceles and diverticula. The latter lesions may be accurately diagnosed by urethroscopy and urethrography. The etiology, pathology and differential diagnosis of urethral lesions are adequately covered. A rather detailed classification of meatal tumors was recommended.

The preferential treatments of the genital infections and urethral lesions are carefully summarized. All abnormal lesions should be removed or destroyed preferably with electrosurgery. In some cases no specific gynecological or urinary lesions can be found after a painstaking examination. The cause of the cystalgia remains undetermined. Neurological disorders such as tabes dorsalis (as cystalgia may be most pronounced in the pretatic period), multiple sclerosis, compression of the extravesical nerves due to tumors or postoperative adhesions, and suture nerve inclusions are suggested as possible etiological factors. Cystalgia is most frequently found in women because they have the most favorable conditions for its development. In these cases the local pains tend to unbalance the general nervous system. No satisfactory treatment is known for these cases although anti-spasmodics may be tried.

LEANDER W. RIBA, M.D.

Washburn, A. D. The Treatment of Aniline Tumors of the Urinary Bladder. *J. Urol.* 1933, 34: 322.

After summarizing 23 old cases previously reported the author reports 63 new cases of aniline tumors of the urinary bladder. Of the present group 39 were single and 24 were multiple tumors treated by fulguration only.

In 1933 the author reported 11 cases of small single tumor of the bladder which were treated by fulguration only. He now reports 30 additional cases so treated which make a total of 50. Deducting 2 cases of death from accident or intercurrent disease, 9 cases diagnosed during the past six months and 3 cases of new primary tumors observed the past three months leaves a total of 36 cases. Three of the patients in this group of cases are free from symptoms and 33 are free from tumors. Nine have been free from tumor for a year or more, 8 for three years or more, and 4 for four years or more.

Of 15 patients with multiple lesions of high grade malignancy 6 succumbed. Cystoscopic fulguration, open operation, implantation of radon seeds to

gether with deep x ray therapy were employed. The author further expresses the opinion that the tumor was not caused by the irritating carcinogenic agent conveyed to the bladder in the urine but was carried to the blood vessels of the bladder and exerted its effect on the vessels. He believes that the disease affected the entire bladder and was not limited to a local area. It was decided therefore to employ deep x ray therapy in the treatment of malignant tumors according to the following technique.

At present five or six small fields about the penis are treated. One hundred roentgens are given to each of two fields daily with the following factors: 200 kv., 25 ma., 100 cm. target skin distance with a Thorax unit equivalent to 1.5 mm. of copper. The exposure time for 100 roentgens to one field with these factors is about thirteen minutes.

High voltage x ray therapy is contra indicated in the presence of urinary obstruction or urinary infection or when there is any appreciable degree of bladder mucosal congestion.

Table 6 in the original article shows that 9 men were treated by high voltage x ray therapy. Two patients did not respond and 2 have had new primary tumors 1 six months after completion of his course of x ray therapy, the other nine months later. The remainder 5 in number are free from tumor and at work. In the cases of 3 of the latter patients a period of thirteen months has elapsed since the courses of x ray treatment were completed.

The patients with relatively normal bladder the non-inflammatory group have been comfortable during the course of x ray treatment and have been ambulatory.

In the patients with advanced urinary infection the x ray technique used not infrequently aggravated the symptoms of burning, vesical tenesmus and micturition frequency.

From the author's experience with the technique described he is of the opinion that there is sufficient devitalization of the tissues to make post irradiation operative procedures inadvisable. He draws the following conclusions after a review of all cases:

In our group of 86 cases there have been 9 deaths approximately 10 per cent. Twenty four (28 per cent) of the patients have been treated recently and 33 (62 per cent) are tumor free.

We venture the opinion that this is a creditable showing especially when one considers that there were 15 patients with extensive highly malignant lesions.

We feel that it would not be inappropriate to mention the factors which in our opinion have been of major importance in our attempt to solve the problems involved.

It must be recorded to the everlasting credit of the industry involved that full responsibility has been accepted and every facility provided for the discovery of early cases and nothing has been left undone to restore to health the affected men.

It must also be recorded that the physicians engaged in industrial medicine have provided sound leadership for those intrusted to their care and protection

Routine cystoscopic examinations of apparently healthy employees instituted by these same men will undoubtedly be the means of saving many lives
J SYDNEY RITTER, M D

GENITAL ORGANS

Clarke, R : The Prostate and the Endocrines. A Control Series *Brit J Urol*, 1937, 9 254

The belief that prostatic hypertrophy as it occurs in man is due to some endocrine abnormality has existed for a long time. The operation of castration and the various Steinach procedures were essentially based on this belief. The recent isolation of the male sex hormone by Butenandt stimulated in many workers in biochemistry and physiology an increasing interest in the endocrine mechanism in the male. Much work has been done by other investigators, but the cause of prostatic hypertrophy is still unknown, however, treatment based on these theories has been suggested. If such therapy could be substituted for surgery, the benefit would be obvious.

There are two different methods of treatment the logical and the empirical. In connection with the former, the question must be asked "What is the nature of the evidence that we will require for conviction that prostatic hypertrophy in man is due to a particular form of endocrine imbalance?" The author suggests that an essentially similar disease be produced regularly in suitable animals, either by extirpation of endocrine organs or by replacement therapy, that is, grafting or hormone administration, and that evidence should be forthcoming of the presence of a corresponding increase or diminution of endocrines in cases of the disease in man. At present endocrine estimations can be made satisfactorily only from the urine. It is hoped that methods will be evolved for satisfactory determination of the hormones which are present in the blood or other body fluids. At present no theory of the endocrine cause of prostatic hypertrophy can be said to fulfill such requirements.

In connection with the empirical method, we must ask, "What evidence do we require before applying endocrine therapy generally to this disease in man?" It is suggested that we have evidence of the efficiency of the preparations used, and of the adequacy of dosage and controls.

The author discusses a series of 93 cases of prostatic obstruction that were not treated by surgery. The vital problem to be decided is that of how far we may be justified in replacing surgery by endocrine therapy, or in allowing surgery to be postponed to see what the endocrines can do. The argument that they will do no harm is quite unsound. The postponement of surgery in some cases may allow irreparable damage to occur. Effective endocrine preparations in adequate doses are sometimes very

expensive. If effective, they may easily be harmful. At present, cases are being treated with at least two theoretically antagonistic preparations. According to the Cleveland Clinic theory, prostatic hypertrophy is due to a diminution in the testicular output of inhibin. The fat-soluble androsterone and its derivatives are being used elsewhere to produce the same effect. If the inhibin theory is correct, use of this substance would tend to increase rather than decrease the hypertrophy. In the face of such disagreement it must be realized that the newer hormones may be actually dangerous and should be used only under expert supervision. Conclusions as to the efficacy of endocrine treatment, or other new methods of treatment, are valid only if cases are followed for a considerable period of time. The suggested period is five years.
ELMER HESS, M D

Shivers, C. H. deT.: New Methods of Pre-Operative Study in Prostatic Hypertrophy. *J Urol*, 1937, 38 288

When heart disease complicates prostatism, the degree of improvement is often in direct relation to the vesical drainage. Drainage, either by urethral catheter or suprapubic cystostomy, should be carried out in every case until the surgeon believes the patient is a good risk for further operative intervention. The author does not agree with those authorities who recommend no preliminary drainage in cases of partial retention in which transurethral resection is to be done. Catheter drainage means infection of the urethra and genital tract. The extent of this infection should be controlled by proper care of the indwelling catheter and a bilateral vasectomy which should precede or immediately follow catheter drainage.

The author states that it has been the practice in the Urological Department of the Atlantic City Hospital, Atlantic City, New Jersey, during the last three years, to add to their pre-operative study a routine intravenous urogram and a cystoscopic grading of all prostates, with a consideration of the shortcomings of each procedure. They found that by intravenous urography they could determine with a fair degree of accuracy the presence or absence of renal excretion, the promptness of excretion, the degree of concentration, and the presence or absence of gross changes (hydronephrosis) in the upper urinary tract.

The author strongly advises against retrograde pyelograms in the presence of prostatic hypertrophy, even when it is mechanically possible to introduce ureteral catheters, as there is always great danger of lighting up a latent infection in one or both kidneys. He does not believe that cases showing gross renal changes in the presence of a persistent pyuria should undergo resection even though all other tests are within normal limits. It is this type of case which frequently gets the "resectionist" into trouble. It is not difficult, by means of the renal-function test and blood chemistry, to estimate with accuracy advanced bilateral renal damage, but unilateral changes may

be frequently overlooked in the study of these cases. Cases with upper urinary tract changes, whether they be bilateral or unilateral, respond much better to a two stage prostatectomy. Urethral drainage does not seem to be adequate and, as the risk is greater, the two stage procedure is definitely safer.

The author states that since they have added to their pre operative study intravenous urography and cystoscopic grading the death rate from infection has been practically nil. Before this routine was adopted they occasionally lost a patient from infection. It is noteworthy that in the pre operative study these same patients had a normal phthalein output.

HARRY W. FLAGGMEIER, M.D.

Bizzozero E. and Franchi F. *Lymphogranulomatosus Urethritis Epididymitis and Orchitis Epididymitis (Urethritis epididymitis et orchitis epididymitis poroadentitiche)*. *Minerva med.* 1937 28 241

Kleeberg called attention for the first time to the existence of a lymphogranulomatous urethritis. He had observed a thirty five year old man whose urethral pus adequately prepared showed marked antigenic properties in patients suffering of lymphogranuloma inguinale.

According to Frei and to others who have observed similar cases, the urethritis was not due specifically to the virus of lymphogranuloma because monkeys inoculated with the urethral pus failed to acquire the disease.

Bizzozero and Franchi have observed 2 cases of epididymitis in which the lymphogranulomatous nature could be easily proved.

The first case was that of a twenty six year old man who has suffered two attacks of gonorrhea complicated by a left epididymitis. He had a positive Wassermann reaction for which he had received eight injections of neosarsphenamine. Subsequent serological reactions were negative. The patient had no complaints except for a slight urethral discharge but about four years later he suddenly developed fever and pain in the right testis followed by a tumefaction of the homolateral testicle. Following a course of 14 intravenous injections of acridine salts the patient noticed a gradual diminution of the size of the testicle. When seen at the clinic the right testicle was found to be about the size of a bean and of increased firmness. The left testicle was somewhat enlarged and the epididymis was tender. At its site there also was found a smooth nodule of about the size of a bean. A whitish urethral secretion was present. Examination of the fresh sperm revealed a few immobile spermatozoa. The intradermal Frei reaction was found to be positive.

The second case was that of a thirty three year old man who also gave a history of gonorrhea and who when seen at the clinic presented essentially the same clinical picture as the former patient. There was also a whitish and not very dense urethral discharge. The Frei reaction was positive. Following treatment with subcutaneous antimony potassium tartrate the urethritis improved considerably.

In both cases a neisserian syphilitic or tuberculous infection was definitely ruled out. The positive Frei reaction on the other hand led the authors to suspect an allergic state of the patients to the virus of lymphogranuloma inguinale.

To prove this the authors used the urethral secretion as an antigen. After suitable preparation according to Frei's method this antigen was injected intradermally in 1 to 2 cm. doses in two series of patients: (a) patients with Nicolas and Favre's disease with a known Frei positive reaction and (b) patients suffering from gonorrhea or syphilis with a Frei negative reaction.

The results obtained were very clear and easy to interpret. The antigens prepared from the urethral secretion of both patients produced in all seven patients in the first group definite positive reactions: nodular and erythematous infiltrations from 3 to 6 mm. in diameter which persisted for over one week. In some cases the original papule was converted into a vesicopustule presenting a central necrosis. The two antigens on the other hand produced no reactions in the second group of patients.

After having briefly reviewed the clinical picture and the pathogenesis of this condition the authors emphasize the necessity of an early diagnosis in order to prevent the development of a suppurative or sclerotic orchitis epididymitis.

RICHARD E. SOUZA, M.D.

Grevillius A. *Malignant Tumors of the Testicle: a Pathological and Clinical Study* (Über maligne Hodengeschwülste: eine pathologische und klinische Studie). *Acta chirurg. Scand.* 1937 70 Supp. 43

There are numerous classifications of the histogenesis and grouping of testicular tumors but the author supports Ewing's view that all testicular tumors are unilaterally developed teratomas and believes that the seminomas are an independent form of tumor. They have a very typical structure are relatively slightly malignant and vary from other malignant tumors in their hormonal relationship. The author's classification of these tumors follows:

- 1 Tumors of connective tissue (*fibromas sarcomas*)
- 2 Tumors of interstitial cells
- 3 Tumors of the excretory tracts (*adenoma adenocarcinoma*)
- 4 Tumors of the sexual cells
 - a Seminomas
 - b Mixed tumors
 - (1) Mature
 - (2) Immature (in which possibly a tissue type which is histologically benign or malignant predominates the malignant type may be similar to cancer chorionepithelioma or sarcoma)
- c Cancer of the testis
 - (1) Simple
 - (2) Adenocarcinoma
- d Chorionepithelioma

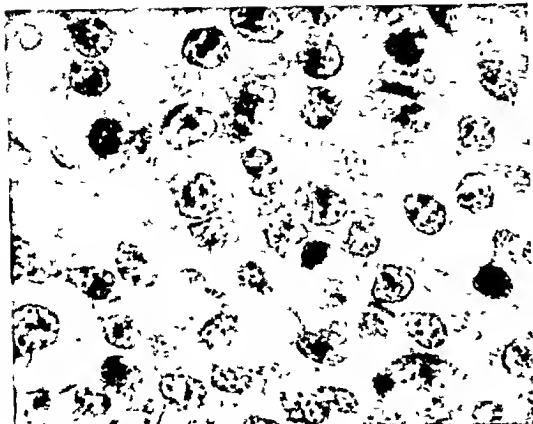


Fig 1 Seminoma Large light, polygonal cells which resemble Sertoli cells

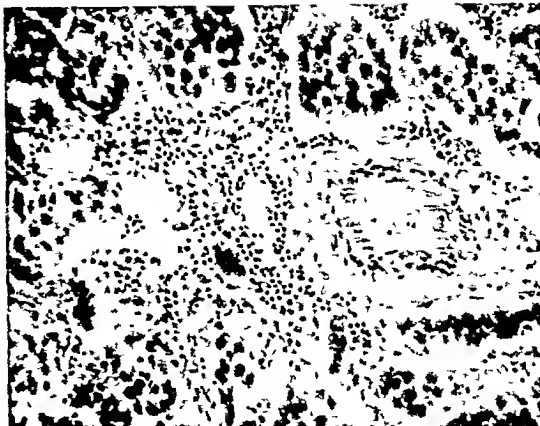


Fig 2 Seminoma Alveolar type Profuse infiltration of round cells

Even though the author does not deny the possibility that tumors which reveal only one type of tissue, e.g., carcinomatous, may be considered as unilaterally developed teratomas, he considers it logically most correct to classify such tumors as independent forms

The author's cases include 112 seminomas, 63 mixed tumors, 7 pure adenocarcinomas, 4 sarcomatous tumors, and 3 of uncertain type

In the case of seminoma the size of the tumors varies from that of a hen's egg to that of a child's head, but it is typical that regardless of the size attained, the normal form of the testis is retained. Occasionally the tunica vaginalis is thickened. In some cases there is a hydrocele, in others the leaves of the serosa may be adherent. The surface of the tumor is generally smooth, occasionally coarsely nodular, but the albuginea is usually intact. An important fact is that the veins in the albuginea are often enormously dilated and form large networks. As long as the tumor remains small, the epididymis often retains its normal form, but with the progress of the malignant process, it is gradually destroyed. The vas deferens is rarely changed. The cut surface is generally homogeneous, smooth, fatty, yellowish-white or yellowish-gray and infiltrated with connective-tissue strands. Occasionally necroses and hemorrhages are seen. Often all the normal testicular substance is destroyed. Microscopically, seminomas are very cellular tumors with characteristic cells, generally round or polygonal, with a large bladder-shaped nucleus and light, weakly staining protoplasm. The nuclei occasionally closely resemble Sertoli cells, also spermatogonia and spermatocytes (Figure 1). This varied appearance is rarely noted in the literature. The cells contain glycogen. The arrangement of the cells is of two types, diffuse and alveolar (Figure 2). Both types may be seen in the same tumor. There may also be syncytial admixtures (Figure 3).

Mixed tumors are almost always congenital. They grow slowly and may reach a considerable size. Malignant degeneration is rare. Usually in the form of a single-layered dermoid cyst, the tumor contains in the solid parts of the wall more or less highly differentiated tissues of various sorts. Macroscopically, it has an irregular form, occasionally containing small nodules and a consistency varying from cartilaginous hardness to fluctuation. The albuginea is rarely involved. The epididymis is usually destroyed, while the vas deferens is rarely infiltrated. There are numerous small cysts, and cartilaginous areas are visible to the naked eye. Necroses and hemorrhages are common especially when chorion-epitheliomatous areas are present. Microscopically, there are mixed among one another the most varying kinds of tissue. These different kinds of tissue may appear benign or malignant. Epithelial tissue is abundant. The squamous epithelium may appear

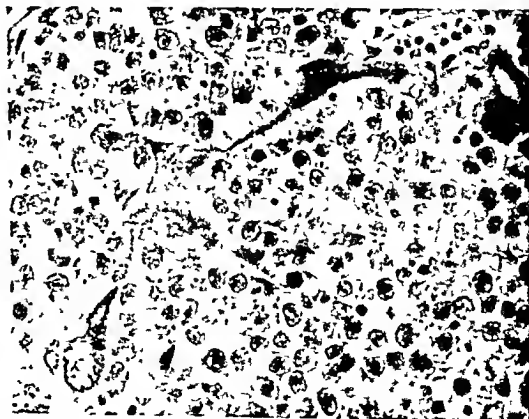


Fig 3 Seminoma Syncytial formation a Giant cell

be frequently overlooked in the study of these cases. Cases with upper urinary tract changes whether they be bilateral or unilateral respond much better to a two stage prostatectomy. Urethral drainage does not seem to be adequate and as the risk is greater, the two stage procedure is definitely safer.

The author states that since they have added to their pre-operative study intravenous urography and cystoscopic grading the death rate from infection has been practically nil. Before this routine was adopted they occasionally lost a patient from infection. It is noteworthy that in the pre-operative study these same patients had a normal phthalein output.

HARRY W. PLACZENIER, M.D.

Bizzozero E. and Franchi F. Lymphogranulomatous Urethritis, Epididymitis and Orchitis Epididymitis (Urethritis, epididymitis ed orchitis epididymitis poradenitiche). *Minerva med.* 1937 28: 241

Kleeberg called attention for the first time to the existence of a lymphogranulomatous urethritis. He had observed a thirty five year old man whose urethral pus adequately prepared showed marked antigenic properties in patients suffering of lymphogranuloma inguinale.

According to Frei and to others who have observed similar cases the urethritis was not due specifically to the virus of lymphogranuloma because monkeys inoculated with the urethral pus failed to acquire the disease.

Bizzozero and Franchi have observed 2 cases of epididymitis in which the lymphogranulomatous nature could be easily proved.

The first case was that of a twenty six year old man who has suffered two attacks of gonorrhea complicated by a left epididymitis. He had a positive Wassermann reaction for which he had received eight injections of neoarsphenamine. Subsequent serological reactions were negative. The patient had no complaints except for a slight urethral discharge but about four years later he suddenly developed fever and pain in the right testis followed by a tumefaction of the homolateral testicle. Following a course of 14 intravenous injections of acridine salts the patient noticed a gradual diminution of the size of the testicle. When seen at the clinic the right testicle was found to be about the size of a bean and of increased firmness. The left testicle was somewhat enlarged and the epididymis was tender. At its site there also was found a smooth nodule of about the size of a bean. A whitish urethral secretion was present. Examination of the fresh sperm revealed a few immobile spermatozoa. The intradermal Frei reaction was found to be positive.

The second case was that of a thirty three year old man who also gave a history of gonorrhea and who when seen at the clinic presented essentially the same clinical picture as the former patient. There was also a whitish and not very dense urethral discharge. The Frei reaction was positive. Following treatment with subbional antimony potassium tartrate the urethritis improved considerably.

In both cases a neisserian syphilitic, or tuberculous infection was definitely ruled out. The positive Frei reaction, on the other hand, led the authors to suspect an allergic state of the patients to the virus of lymphogranuloma inguinale.

To prove this the authors used the urethral secretion as an antigen. After suitable preparation according to Frei's method this antigen was injected intradermally in 1 to 2 cm doses in two series of patients: (a) patients with Nicolas and Favre's disease with a known Frei positive reaction and (b) patients suffering from gonorrhea or syphilis with a Frei negative reaction.

The results obtained were very clear and easy to interpret. The antigens prepared from the urethral secretion of both patients produced in all seven patients in the first group definite positive reactions: nodular and erythematous infiltrations from 3 to 6 mm in diameter which persisted for over one week. In some cases the original papule was converted into a vesicopustule presenting a central necrosis. The two antigens on the other hand produced no reactions in the second group of patients.

After having briefly reviewed the clinical picture and the pathogenesis of this condition the authors emphasize the necessity of an early diagnosis in order to prevent the development of a suppuration or sclerotic orchitis epididymitis.

RICHARD E. SOWMI, M.D.

Grevillius A. Malignant Tumors of the Testicle a Pathological and Clinical Study (Über maligne Hodengeschwülste eine pathologische und klinische Studie). *Acta chirurg. Scand.* 1937 79: Supp. 48

There are numerous classifications of the histogenesis and grouping of testicular tumors but the author supports Ewing's view that all testicular tumors are unilaterally developed teratomas and believes that the seminomas are an independent form of tumor. They have a very typical structure and are relatively slightly malignant and vary from other malignant tumors in their hormonal relationship. The author's classification of these tumors follows:

- 1 Tumors of connective tissue (fibromas, sarcomas)
- 2 Tumors of interstitial cells
- 3 Tumors of the excretory tracts (adenomas, adenocarcinomas)
- 4 Tumors of the sexual cells
 - a Seminomas
 - b Mixed tumors
 - (1) Mature
 - (2) Immature (in which possibly a testicular type which is histologically benign or malignant predominates, the malignant type may be similar to cancer, chorionepithelioma or sarcoma)
- c Cancer of the testis
 - (1) Simple
 - (2) Adenocarcinoma
- d Chorionepithelioma

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Pereira, S : Reversal of the Epiphyseal Cartilage and Its Effect Upon the Process of Endochondral Ossification and Bone Growth (*Le renversement du cartilage de conjugaison et son influence sur le travail d'ossification enchondrale et la croissance de l'os*) *Lyon chir*, 1937, 34 513

After briefly reviewing the normal process of endochondral ossification, the author reports the results of his experiments with rabbits from six to eight weeks old in which he operatively reversed the epiphyseal cartilage of the lower end of the ulna

In analyzing the results of his experiments the author found that following isolation and reversal or autotransplant of the epiphyseal cartilage into the diaphysis of the bone, endochondral ossification proceeds at a normal rate. The cartilage conserves the direction and the general plan of its activity as before the intervention. Reversal of the cartilage does not alter these conditions in the least

However, isolation, and reversal or autotransplant produce modifications in the epiphyseal cartilage which influence endochondral ossification, and consequently the bone growth, in longitudinal direction. Following isolation of the epiphyseal cartilage of the lower end of the ulna, a slight decrease in length (about 1 mm) results seven or eight weeks after the operation. This increases (from 3 to 5 mm) a few months later, at the end of bone growth

Concerning the morphological modifications of the epiphyseal cartilage following its isolation, the author observed during its growth a slight irregularity in the orientation of the columns of chondroblasts. At the end of growth the bone replacing this abnormal cartilage could not be differentiated from normal bone

Following the reversal of the epiphyseal cartilage, either alone or combined with adherent bone spicules, the cartilage was always pushed toward the epiphysis which produced a bony segment of a length varying from 2 to 6 mm. In all cases the ulna underwent a shortening of not more than 6 mm during the period of from four to eight weeks following the reversal of the cartilage. During the following months this shortening increased to from 8 to 18 mm

Reversal of the cartilage did not affect endochondral ossification. The diaphyseal face of the cartilage which normally presents the greatest cellular activity showed the same intense activity when turned toward the epiphysis as in its original position. During the first few weeks following reversal, the cartilage presented an almost normal structure but in the following weeks the process of endochondral ossification became more irregular and its activities were diminished. From two to four months follow-

ing the reversal, the cartilage had lost almost completely the power of producing bone. Its architecture, however, remained unchanged, and it was surrounded by bone marrow. At the end of growth, the resulting bony lamellæ replacing the reversed cartilage were found to be normal in every respect

Following transplantation of the epiphyseal cartilage into the diaphysis of the bone either in normal position or by reversal, growth did exceed 3 mm, but the total shortening of the ulna varied between 7 and 15 mm. Similarly, reversal of the epiphyseal cartilage which had been grafted into the shaft of the ulna did not influence the process of endochondral ossification. The author observed only a diminished activity in the cartilage, but bone formation occurred more rapidly. It is evident that the location of the graft plays an important rôle in the growth of the epiphyseal cartilage and therefore also in the lengthening of the bone

RICHARD E. SOMMA, M D

Kaplan, L., and Ferguson, L. K.: Bursitis *Am J. Surg*, 1937, 37 455

Bursæ contain a synovial-like fluid which permits movements of one tissue over another with a minimum of friction. They are developmental in origin and appear in response to a functional demand.

Bursæ may be divided into two groups, the superficial and the deep. Superficial bursæ lie between the skin and the bony prominences, while the deep bursæ lie between muscle and the moving bony points

The superficial bursæ are the olecranon, the prepatellar and the one over the head of the metatarsophalangeal joint. Their diseases may be divided into acute (traumatic, suppurative), subacute, and chronic bursitis

In acute traumatic bursitis there is a history of trauma with the subsequent appearance of tenderness and distention of the bursa. Treatment by immobilization prevents further injury, decreases pain, and makes for early subsidence of the acute symptoms. Cold applications are used for the first two or three days, after which, heat may be of value. Aspiration of a fluctuating sac will give relief and shorten the course of the inflammation. Protection of the area against subsequent trauma is important.

In acute suppurative bursitis splinting, rest, and hot wet dressings are advocated; incision and drainage may be indicated later if the initial treatment fails

In subacute and chronic bursitis frequent mild trauma usually causes the condition and the resultant formation of fibrous tissue. The treatment consists of obliterating the sac completely by injecting some sclerosing solution into the bursal cavity after aspiration of the contained fluid. The sclerosing solutions suggested are sodium morrhuate,

as solid cell strand and pile up possibly with central hornification or it may fill the cyst wall, in layers and tube shaped structure. Both squamous and cylindrical epithelium and transition forms may occur in the same cyst. Glia tissue is often present. The connective tissue is distributed between the epithelial bands, often being of the embryonal type. Myxomatous tissue is seen also. Cartilage is often found either in the form of small islands or constituting large parts of the tumor, most often it is of hyaline and sometimes of the embryonal type. Bone tissue is seen. Smooth muscle is usually present. The tumors are generally very vascular. Pigmentation results from the rupture of the thin walled blood vessels.

Atypical malignant proliferations of varying extent are often present. There are also simple undifferentiated cancer types as well as adenocarcinomatous formations. Chorionepithelioma like formations are another form of malignant proliferation in testicular tumors. They have two components syncytial and so called Langhans cells. The connective tissue elements occasionally show polymorphous proliferation resembling sarcoma. Pure testicular tumors are rare. The sarcomas may be of the spindle cell or the round cell type.

Seminomas may produce an increased excretion of follicle stimulating hormone while the mixed tumors produce an increased excretion both of the latter and of luteinizing hormone. The cases in which an increased hormone excretion persisted in spite of operation and roentgenotherapy all ended fatally, whereas in the cases that showed no increased hormone excretion recovery took place. Hormone tests are therefore of great importance prognostically. From the diagnostic standpoint the positive reaction of the anterior pituitary lobe in the presence of testicular affection makes the presence of a malignant tumor most probable. A negative reaction has no significance.

Testicular tumors are quite rare. Among a series of 2753 patients with malignant tumor in males 36 had testicular tumors. Before the twentieth year of life these tumors are very rare, but after that the frequency does not vary much at different ages. In many cases the patient mentions trauma as the cause of the tumor but in no case could such a statement be proved. Nevertheless it is possible that a hemorrhage may occur more readily in a tumor than in a normal testicle and therefore a slight trauma may produce a hematoma which attracts the patient's attention.

A retained testicle is attacked by malignant degeneration considerably more often than one in the scrotum. In the author's case retention was found in 65 per cent. In 4 of these the testicle had not

descended. It is suggested that operation should be done in such a way that the testicle does not remain hidden postoperatively but is subject to control.

As to the general symptoms, seminomas usually develop more slowly than mixed tumors. The probable duration of disease for the fatal seminomas was eighteen months and for the lethal mixed tumors eleven months. The latter indicate their greater malignancy by the fact that the metastases occur earlier and lead to death more rapidly. One patient revealed a gynecomastia, a true hypertrophy of the mamma with colostrum formation. Such cases are rare. The symptoms of seminomas and mixed tumors are about the same. The great importance of the earliest possible diagnosis is emphasized as well as the value of the hormone analysis.

The following were the results of treatment after four years and more:

After simple extirpation 50 \pm 7 per cent of 40 patients with seminomas and 35 \pm 8 per cent of 31 with mixed tumors were living after extirpation of the testicle plus roentgenotherapy, 59 \pm 6 per cent of 39 with seminomas and 15 per cent of 13 with mixed tumors were living. Some of the cases of seminoma with metastases were saved by irradiation in some the improvement was only transient while in others the irradiation was unsuccessful. The mixed tumors were almost insensitive to irradiation. However postoperative irradiation therapy should be given in every case but preoperative irradiation therapy is contra indicated according to the author. The best treatment for malignant testicular tumor is extirpation of the tumor as soon as the diagnosis is made even though metastases are present. After that repeated postoperative roentgenotherapy should be given. Repeated follow up examinations including hormone analysis of the urine should be made.

The prognosis depends upon the timeliness of operation and the type of the tumor. The seminomas showed a mortality of 42 \pm 5 per cent. Because of their great radio-sensitivity the prognosis is not absolutely hopeless even with metastases. In the cases of immature mixed tumors the mortality was 61 \pm 7 per cent and in those with metastases the prognosis was the worst. Hormone analysis gives important prognostications. If the amount of excreted hormone increases in spite of operation or irradiation therapy the prognosis is bad whereas a decreased excretion is a good sign. Cases of mixed tumor usually show metastases within a year after discovery. Since metastases of seminomas may appear years after operation the patients operated upon for seminoma should remain under control for a period of several years following the operation.

LOUIS NEUWELT M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

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RICHARD E. SOMMA, M.D.

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Fig 1 Calcification in the floor of the subacromial bursa. Note how little of the calcified deposit is visible in



the view at the left as compared with that on the right taken after rotating the arm

tincture of iodine or a solution made up of phenol borax, salicylic acid, glycerin and spirits of camphor.

The deep bursae are the subacromial, subgluteal, iliopectineal, supratrochanteric, semimembranous and pretibial. The diseases of these deep bursae may be divided into acute (traumatic calcification), subacute and chronic bursitis.

Acute traumatic bursitis is usually due to a direct injury to the bursa or adjacent structures. The treatment is primarily by immobilization.

In acute bursitis due to calcification, the cause of the pain is the tension in an area of calcification. In the case of subacromial bursitis the humerus should be rotated into two or more positions in order to demonstrate the mass with the roentgen rays.

Two methods of treatment are suggested:

1. Incision of the bursa under local anesthesia to allow the bursal contents to escape. The relief of tension gives immediate subsidence of pain.

2. Aspiration of the calcified material and irrigation of the area. Disability rapidly subsides and complete function may return in three or four days.

In subacute and chronic bursitis the pathology may simply be post-traumatic or due to slight calcification with roughening of the floor of the bursa. Atrophy of the adjacent muscles may be noted when this condition has continued for some time. Open operation as a rule gives disappointing results. The treatment which gives most consistent good results is the injection of local anesthesia into the bursa before manipulation followed by exercises, heat, counter-irritants, gentle massage and the use of analgesics if necessary.

Inflammatory lesions of the deep bursae other than the subacromial are uncommon.

RICHARD J. BENNETT, JR., M.D.

Meulengracht E. and Meyer A. R. Osteomalacia of the Spinal Column. *Acta med Scand* 193 92: 354.

Nutrition experiments have shown that osteomalacia and the closely related rickets are derangements of the calcium and phosphorus metabolism due to deficiency of Vitamin D. This metabolic disturbance causes inhibition of physiological bone regeneration and deficient calcification of newly formed bone tissue resulting in halisteresis and osteoporosis of the skeletal system. The blood phosphorus concentration is reduced while the blood calcium may be normal or diminished. A negative calcium balance is found in advanced cases. The modern conception of osteomalacia as the result of deficient nutrition has also thrown some light upon some clinical pictures, the connection of which with osteomalacia has long been problematical.

Osteomalacia attacks especially women during or after pregnancy and results in enormous bone deformities but it may also occur in non-pregnant women and even in men with characteristic involvement of only the spinal column and ribs while the bones of the pelvis and extremities escape. The same characteristics apply to senile osteomalacia and its differentiation from osteoporosis has been disputed. These types of osteomalacia are more common than is generally supposed as was shown in the years after the World War when the so-called "hunger osteomalacia" appeared in Austria and Germany with the spinal symptoms often very pronounced. Osteomalacic changes are an integral part of the clinical picture of hunger osteopathy. Severe cases of osteomalacia, which apart from affection of the spine also showed characteristic pelvic lesions, have recently been observed in Denmark.

Four of the author's cases are reported. In the first case a woman, aged fifty-eight years, developed thoracic kyphoscoliosis with pains in the shoulder, back, and loin. Roentgenography showed pronounced halisteresis of the spine and collapse of several thoracic vertebrae. Treatment with Vitamin D and calcium quickly produced a striking subjective improvement. Interruption of the Vitamin D treatment caused a recurrence of the subjective symptoms.

In the second case, that of a man aged forty-two years, the patient developed severe pains in the back after a deficiency diet for "dyspepsia" for five years. Roentgenography revealed extensive destruction and collapse of thoracic and lumbar vertebrae and shortening of the trunk. Repeated roentgen-ray treatment for supposed multiple myelomas had no effect. On a complete diet with Vitamin D and calcium, the pains disappeared and the progress of the bone lesions was arrested.

The third case was that of a seamstress, aged sixty-four years, who lived mainly on a vegetarian diet, including milk products. She had pain in the loin, radiating down the leg. Roentgenography revealed halisteresis of the spine with hourglass vertebrae. On treatment with full diet and Vitamin D and calcium, the subjective symptoms disappeared. Omission of Vitamin D and calcium did not affect her condition, but the pain recurred when milk was discontinued.

In the fourth case, that of a woman, aged seventy-seven years, who was living on an inadequate diet, severe lumbar pains occurred. The spine showed halisteresis and hourglass vertebrae. Under administration of Vitamin D and calcium the subjective symptoms rapidly disappeared.

Even in countries where osteomalacia is considered to be very rare, a syndrome closely resembling osteomalacia clinically and etiologically is found. In the early stages the symptoms are not characteristic. The pains are considered "rheumatic," and ineffective physical therapy is given. Its failure alone gives a hint of the diagnosis. The fact that the disease not only starts in the spine but remains localized there, so that advanced deformity and destruction of the spine may occur without implication of other skeletal parts, is at variance with the prevalent clinical conception of osteomalacia.

Even in the early stages of this disease roentgenography reveals osteoporosis of the skeletal system, either general or far advanced in the spine. As the disease progresses, a characteristic excavation of the superior and inferior surfaces of the vertebral bodies appears, giving the appearance of an hourglass in the lateral view. Soon destructive processes lead to vertebral collapse and spinal deformity. However, none of these changes are characteristic of osteomalacia alone. Hyperthyroidism, often starting with pain in the extremities and difficulty in walking, may in its early stages show generalized osteoporosis and only later multiple, cystic lesions characteristic of this disease. A disturbed calcium

metabolism is also found in hyperparathyroidism, but while the serum phosphorus values are reduced in both osteomalacia and hyperparathyroidism, in the latter there is characteristic hypercalcemia. The differential diagnosis between the two diseases may be difficult when the blood changes are not definite. Necropsies in osteomalacic cases usually show moderate hyperplasia of the parathyroids, which is considered as a compensatory measure to counteract the disturbed calcium metabolism in osteomalacia.

Primary and secondary tumors of the spine must also be differentiated. The primary stages of multiple myelomas may cause spinal pain and osteoporosis alone, the advanced stages may also recall osteomalacia, but systematic roentgenography will reveal multiple destructive foci, especially in the cranium, characteristic of myelomas.

It may be difficult to distinguish osteomalacia from senile osteoporosis in old patients, especially when the senile bone atrophy is manifested not so much by increased fragility of the bones in the extremities as by the spinal deformity. The relation between the two clinical pictures is still under discussion.

Although it is established that a deficient diet plays a decisive rôle, several etiological points are still undecided. The hunger osteomalacia after the World War was often preceded by undernourishment from a diet deficient in calories. However, this is not a necessary factor of the disease for not all famines are followed by osteomalacic symptoms. Moreover, a diet deficient in calories usually is defective in other respects, such as Vitamin D or calcium, or both. Vitamin D is absent in vegetables and cereals. It is important as it causes an increased retention of calcium and phosphorus in the body. A pure Vitamin D deficiency need not, however, produce morbid changes. Reduced or inadequate content of calcium and phosphorus is a further requirement for the development of osteomalacia. Recent animal experiments indicate that the latter condition alone, without a Vitamin D deficiency can produce the pathological changes. It seems that the absorption and assimilation of calcium salts is the crux of the problem. For their absorption not only must the quantity and relative proportion of calcium and phosphorus in the food be favorable, but local conditions in the small intestine also play an important part. For example, an increased alkaline reaction or a larger quantity of free fatty acids may retard or prevent calcium absorption by forming insoluble calcium compounds. Hence, morbid conditions leading to such changes in the intestine may show signs resembling osteomalacia. However, even in true osteomalacia, such endogenous factors may cause the disease, therefore, osteomalacia cannot be regarded as being due to a single definite dietary deficiency, but a combination of such deficiencies.

All 4 of the author's patients suggested malnutrition from a calory-deficient diet, but it was certain in only one, who was on a very strict diet for five years. All of the patients showed a deficiency in



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Nutrition experiments have shown that osteomalacia and the closely related rickets are derangements of the calcium and phosphorus metabolism due to deficiency of Vitamin D. This metabolic disturbance causes inhibition of physiological bone regeneration and deficient calcification of newly formed bone tissue resulting in halisteresis and osteoporosis of the skeletal system. The blood phosphorus concentration is reduced while the blood calcium may be normal or diminished. A negative calcium balance is found in advanced cases. The modern conception of osteomalacia as the result of deficient nutrition has also thrown some light upon some clinical pictures the connection of which with osteomalacia has long been problematical.

Osteomalacia attacks especially women during or after pregnancy and results in enormous bone deformities but it may also occur in non-pregnant women and even in men with characteristic involvement of only the spinal column and ribs while the bones of the pelvis and extremities escape. The same characteristics apply to senile osteomalacia and its differentiation from osteoporosis has been disputed. These types of osteomalacia are more common than is generally supposed as was shown in the years after the World War when the so-called "hunger osteomalacia" appeared in Austria and Germany with the spinal symptoms often very pronounced. Osteomalacic changes are an integral part of the clinical picture of hunger osteopathy. Severe cases of osteomalacia which apart from effect on the spine also showed characteristic pelvic lesions have recently been observed in Denmark.

On December 11, 1936, Donati operated on the patient. Through a transverse medial incision a polypoid mass was found in the interarticular space. The medial meniscus was normal.

The tissue removed measured 2 by 3 cm. Microscopic section revealed a great many cavernous sinuses filled with blood and lined with endothelium. A pathological diagnosis of a cavernous angioma of the articular capsule of the knee was made.

The patient made an uneventful recovery.

The author presents in abstract 22 cases of the same disease collected from the literature from 1893 to 1937. He takes up the symptomatology, the differential diagnosis, and histopathology in detail. He also discusses trauma as a causative factor, in which he very definitely believes.

CARLO S. SCUDLARI, M.D.

FRACTURES AND DISLOCATIONS

Meyerding, H. W. • The Treatment of Acromioclavicular Dislocation. *Surg. Clin. North Am.*, 1937, 17: 1199.

Physicians who treat injuries of the shoulder must bear in mind the importance of differentiating between partial and complete dislocation of the acromioclavicular joint.

Immediately following separation of the acromioclavicular joint, the patient will complain of pain over the shoulder and disability. Inspection will disclose an obvious deformity. If there is a separation of 1 in. or more, it indicates that a rupture of the coracoclavicular ligament has occurred. In such a case, complete separation may be diagnosed. Later, swelling obscures the deformity, and palpation may be difficult and painful. Routine roentgenological examination should be made in every case in which there has been an injury to the shoulder; anteroposterior and transaxillary roentgenograms should be made to determine the exact extent of the displacement and to rule out fracture.

Litigation, insurance, and compensation frequently demand that the physician have a knowledge of the time and type of injury, the clinical and roentgenological findings, the treatment employed, and the results in terms of function.

When emergency treatment is given some distance from a hospital or the physician's office, a supporting sling or fixation with adhesive tape is advisable during transportation. This should be removed during physical and roentgenological examination. The proper course of treatment can be determined after a final diagnosis has been made.

Should the findings disclose an incomplete dislocation, the arm should be supported by a sling, adhesive tape, or plaster cast. The surgeon should make sure that the arm is pulled upward and backward and thus maintained throughout the period of fixation, which should be three weeks. The dressings should be observed daily, if possible, to make certain that displacement of the clavicle has not occurred.

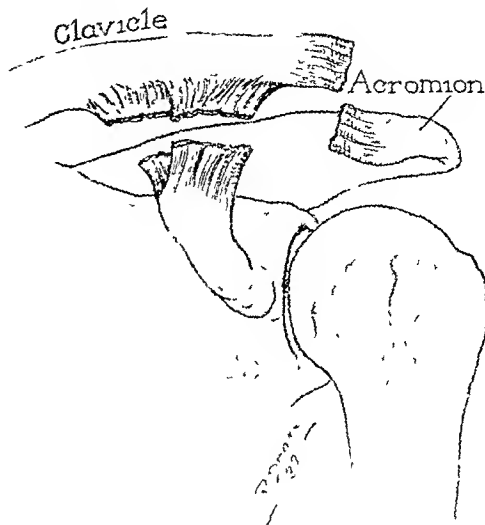


Fig. 1. Complete dislocation of acromioclavicular articulation with rupture of capsular ligaments and the extra-articular coracoclavicular ligaments.

Operation has not been found necessary unless some interference with reduction has occurred.

Recent complete dislocations usually may be reduced readily. Suture or fascial fixation of the acromioclavicular joint in the presence of complete dislocation is inadequate, and some form of reconstruction of the coracoclavicular ligament is necessary. If these two operations are combined and adequate postoperative support is maintained, the results are most gratifying. Arthrodesis of the acromioclavicular joint limits the function of the shoulder, therefore it is not advised. Nailing or wiring through the joint produces traumatic arthritis. The use of wire, silk, or rubber tubing has been successful, but fascial transplants are preferable.

Meyerding prefers to use fascia lata as a reconstructive material, it is an autogenous tissue which lives, does not cut out, and does not cause irritation. It may be used as an envelope and sutured about the acromioclavicular joint as a capsule, and passed through bone under or above the joint to reconstruct the superior or inferior acromioclavicular ligaments. Some increased strength is obtained by repairing these ligaments in addition to the coracoclavicular ligament. In repairing the acromioclavicular ligaments, drill holes not larger than from $\frac{3}{16}$ to $\frac{1}{4}$ in. are preferable.

Excellent exposure for repair of a complete dislocation may be obtained by the use of a curved incision which begins at the acromion and extends over the clavicle and downward medially to the coracoid process of the scapula. The acromioclavic-

Vitamin D and 3 showed a deficiency in calcium. Milk, an important source of calcium, was practically omitted from the diet of these 3 patients. This deficiency occurs more easily with unbalanced diets, as there is only a small surplus of calcium in the normal diet.

Probably some of the factors known to be causative in osteomalacia were operative in the author's cases, but it is not impossible that other nutritional deficiencies contributed to the pathological changes. The diets responsible for the hunger osteomalacia following the World War were deficient not only in vitamins and mineral salts, but also in proteins and fats. Hence the term 'deficiency bone disease' is preferred by some authors to osteomalacia. The clinical picture resulting from unbalanced diets may be a combination of syndromes dependent on nutrition. There may be a tendency to edema with the bone changes in hunger osteomalacia. The authors report a case showing a combination with scurvy in which the scorbutic symptoms dominated the picture. Therefore the development of spinal osteomalacia should lead to the search for the changes whenever the dietetic history indicates. The authors prefer the term 'osteomalacia of the spine' whenever a spinal disease due to faulty nutrition conforms closely with the clinical, therapeutic and etiological aspects of the classical forms of osteomalacia.

LOUIS NEUWELT, M.D.

Ober, F. R. The Relation of Fascia Lata to Conditions in the Lower Part of the Back. *J. Am. M. Ass.* 1937 109 554.

A survey of 413 patients with lame back and sciatic pain was made to determine the value of division of the fascia lata above the trochanter. Complete relief was obtained in 75 per cent of the cases, partial relief in 4 per cent, and no benefit in 21 per cent. The operation is indicated in cases of low back or sciatic pain if the normal lumbosacral angle is increased or decreased. The contracted fascia lata may exert an abnormal pull on the pelvis and disturb the mechanics of the whole spine.

The operation is contra-indicated if roentgen ray evidence of abnormality of the spine exists. Fasciotomy should not be done unless all the special tests show the fascia to be contracted. Sciatic pain is not a prime indication for operation until pathological change of the spine, spinal cord or sciatic nerve have been ruled out. The author is unable to state whether the mechanical distortion of the spine causes sciatic pain or whether the pain results from pressure of spastic muscles of the posterior hip-joint region.

JEROME G. FINDER, M.D.

Callen, H. S. Pellegrini Stieda's Disease. A Manifestation in the Knee of Post-Traumatic Changes Common to Other Joints. *Radiology* 1937 29 148.

Pellegrini and Stieda independently and at about the same time called attention to a calcification or ossification of the tibial collateral ligament occurring

after trauma. Numerous reports of the so-called Pellegrini Stieda's case have since appeared in both the European literature and that of the United States.

Even in the literature of the so-called Pellegrini Stieda's case it is reported that other structures about the knee joint rather than the tibial collateral band are involved, viz. the tendons of the adductor magnus and vastus medialis. Changes in subileoid bursitis are similar as they are due at times to ossification. Myositis ossificans also has similar deposits, and in this condition as in Pellegrini Stieda's disease recurrence of the pathological process has been found after too early surgical intervention.

Ossifications have also been found to occur about joints in some cases of paraplegia after rough handling. Attention is called to the impossibility of roentgenographic differentiation between calcification and osseous deposits in the absence of trabeculation. Histological examination of these deposits is necessary to determine exactly whether the process is one of calcification or ossification. Some of the deposits will disappear spontaneously or after physical therapy, while in other instances such deposits persist in spite of medical treatment.

Fatty degeneration which is thought to precede calcification is suggested as a cause for the delay in the appearance of roentgen ray findings after injury. It may be that ligaments and tendons tend to acquire inclusions of primitive mesenchymal tissue destined to form bone which lies dormant until stimulated by trauma.

Hence the authors believe that Pellegrini Stieda's disease is not truly a disease entity but merely a local manifestation in the knee of post-traumatic changes common to all joints.

HAWTHORNE C. WALLACE, M.D.

Ragnotti, E. Angioma of the Articular Capsule of the Knee (*Angioma della capsula articolare del ginocchio*). *Arch. ital. di chir.* 1937 46 159.

Of 1674 cases of angioma studied by Stewart and Bettin in 1923, only 9 per cent were localized to the lower extremities, and of these only 10 cases were in the knee joint.

The author reports the case of a laborer aged thirty-six. In 1917 at the age of fifteen while attempting to rise from the squatting position he felt a severe pain in the left knee which confined him to bed for the next five days. Some pain persisted in the knee or the inferior medial border of the patella. During the war long marches aggravated the condition. In 1927 an exacerbation of pain occurred. On December 5, 1936 the patient entered the clinic with a diagnosis of arthritis of the knee. The local findings were essentially a globular swelling of the knee with some atrophy of the thigh muscles. On the medial side of the patella an olive-sized elastic swelling was present. There was a slight limitation of flexion. Roentgen ray findings were negative. Pneumarthrosis revealed no pathological changes in the roentgenogram.

term "vertebral fracture" always makes an alarming impression and interferes with the determination to get well. One should merely mention muscle rupture and attach little or no importance to the injury. The muscle-traction fracture of the spinal processes is the most frequent and at the same time the least harmful fracture of the vertebral column, provided the patient is ignorant of the true diagnosis. It is caused by the disturbed coordination of the different muscles arising from the vertebral spines, the trapezius is most often involved.

The patients are definitely entitled to compensation insurance provided the fracture follows an accident. If the rupture occurs in the course of the lifting of weights not excessive for the strength of the laborer, or during ordinary shoveling, then also the patient should be compensated legally, but the cause is a muscle fatigue due to the monotony of occupation.

(A BRUNNER) MATHIAS J SEIFERT, M D

Rankin, L M : Fractures of the Pelvis *Ann Surg*, 1937, 106 266

This is a statistical study covering 449 cases from 4 hospitals. Multiple fractures occurred more often than single fractures.

The treatment of choice was the use of an overhead suspended hammock with traction to the legs and early physical therapy.

There were 40 deaths and 46 different kinds of complications. There were 6 cases of ruptured bladder.

The average period of total disability in uncomplicated cases was sixteen and four-tenths weeks, and before return to regular work twenty-three and six-tenths weeks. DANIEL H LEVINTHAL, M D

Hey Groves, E. W : The Modern Treatment, and Results of Treatment of Fractures of the Neck of the Femur *Brit M J*, 1937, 2 359

The author describes the introduction of the Smith-Petersen nail, in 1929, and how its introduction has changed the attitude of those who treat this type of fracture. He states that "zeal has out-run discretion, and extravagant claims are made which may lead to disillusionment later." He describes the advantages and disadvantages and hopes that when statistics are published, they may show success in 75 per cent of the cases. The saving in the amount of suffering and invalidism, and the more rapid recovery is considered.

Three methods of insertion of the Smith-Petersen nail are described, (1) the open operation, (2) blind insertion over wire guides, and (3) blind insertion with the help of a mechanical director.

The open operation with its Watson-Jones modification gives accurate reduction and placement of the nail, but it takes nearly an hour, there is loss of blood and a wide exposure, which the author believes is unjustifiable in the old and feeble patients.

The blind insertion of the nail over wire guides, described by Johansson, Jerusalem, and King, has

two great drawbacks (1) it involves an anesthesia of one or two hours, and, (2) it requires taking and interpreting many films.

Hey Groves uses his mechanical director, which is a pronged guide, one prong touches the middle of the head of the femur and the other the base of the femoral neck. This gives the axis of the neck. A short incision is used, the operation is bloodless and is done under gas-ether anesthesia in from ten to fifteen minutes.

The writer permits his patients to be up in a week with crutches and to bear weight in six weeks. The nail is removed three months after its insertion.

The late cases with non-union may be treated by the bifurcation osteotomy, Schanz's cuneiform osteotomy, or the Whitman reconstruction operation.

DANIEL H LEVINTHAL, M D

Maddock, S., and Jensen, D. : The Treatment of Septic Compound Fractures of the Tibia with Maggots. *New England J Med*, 1937, 217 123

The authors report the results of the treatment of 44 cases of septic compound fracture of the tibia with maggots. No cases are included in which treatment was begun after September, 1936. They divide their infected compound fractures into several groups.

In the first are cases of acute sepsis with avulsion of the soft tissues. In these treatment may be started immediately upon control of the gross bleeding. As soon as the splints are applied the larvae are placed in the wound and the area covered with gauze fluffs and cellucotton. The dressing need not be changed for forty-eight hours. If the infection is severe enough to require amputation, the leg will be kept sufficiently clean to permit this operation at an optimum time.

The second group consists of cases of acute sepsis without avulsion. Most of these cases were originally treated by débridement and primary suture. When infection became apparent the sutures were removed and Dakin's solution or warm fomentations were used. If the infection did not then show signs of subsiding, maggot treatment was begun. Bands or plates were allowed to remain in position as long as they fulfilled their function.

In the third group the cases presented acute sepsis following open operation. The sutures were removed and maggots implanted in the wounds. Bone grafts, bands, or plates were not removed until they ceased to be useful.

In the last group the cases presented chronic sepsis. They were treated with maggots for at least three or four weeks before operation. During this period some healed or at least showed that there was no bone involvement. These cases were then treated with skin grafts. In the event of true bone involvement the maggots tended to demonstrate its location, and it was not unusual to find that this area did not correspond with the roentgen-ray or clinical findings. After the period of study and treatment with maggots a typical effacement operation was

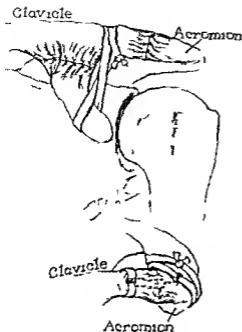


Fig 3 Acromioclavicular dislocation reduced strips of fascia lata used to reconstruct ligamentous support and fascial transplant used to reconstruct coracoclavicular ligament

ular joint is exposed by a dorsal incision carried well over the clavicle and with a sharp periosteal elevator the attachment of the deltoid muscle is separated so as to leave spicules of bone attached. ^P, separation of the deltoid muscle from the pectoralis major muscle the cephalic vein and deltoid muscle may be retracted outward to expose the coracoid process. To repair the coracoclavicular and acromioclavicular ligaments two strips of fascia lata are necessary. Silk sutures are used to fix the fascia as it crosses on the dorsum of the clavicle they are passed through the knot in the fascia lata in order to prevent slipping. The ends of the coracoclavicular ligament may be freshened and sutured. The torn acromioclavicular ligaments are repaired by using the narrow strips of fascia lata which are looped around the distal end of the clavicle and the two ends passed downward through a hole $\frac{1}{4}$ in in diameter and under the acromioclavicular joint so as to emerge through a similar drill hole in the acromion. The fascia is pulled tight passed under the acromion tied above the acromion and the knots are sutured. By freshening the ends of the capsular tissues and suturing them further strength is secured. Wounds are closed without drainage and gauze dressings moistened with 70 per cent alcohol are applied and held in place with adhesive tape.

Care must be taken to maintain the reduction and not bring undue strain on the fascial support while external fixation casts splints and bandages are being applied. Plaster of Paris should be applied so as to hold the clavicle down and the arm and shoulder up. The arm should be held in corrected position until the plaster hardens. Fixation is maintained for from six to eight weeks. Physical therapy is then employed. Good results usually are obtained within three months after the operation.

Zollinger F. Isolated Spinous Process Fractures with Special Consideration of the Muscle Traction Fractures—Schipper's Disease (Isolierte Dornfortsatzbrüche mit besonderer Berücksichtigung der Muskelzugfrakturen Schipperkrankheit) *Schweiz med Wochenschr* 1937 1 485 505

Spinous process fractures are by no means rare. The author reports 78 cases which were caused solely by muscle traction. In addition to these he is acquainted with a considerably smaller number of cases caused by a circumscribed contusion or an abrasion as from sudden excessive bending of the vertebral column. Those most frequently affected are hod carriers and handy men laborers in building trades. The preference for youthful laborers for these jobs may be a constant factor. A relatively large number of fractures occurred during shoveling. In the smaller group of cases an accident complying with compensation insurance was demonstrable. Most of the patients carried occupational indemnification. The author's experience does not confirm the belief that most of the injured are laborers not accustomed to hard excavation or earthwork labor.

In the majority of cases the tearing fractures were manifested by such violent splitting pairs between the shoulder blades that work had to be discontinued immediately. Very infrequently the pain gradually increased. Sometimes sudden cracking, crashing or crunching occurred. The pain did not correspond with the site of the fracture or injury. The cervical spine was held uprisingly rigid. Not infrequently a downward displacement of the fractured end of the spine could be seen or at least palpated. Lateral movements and fine bony crepitus confirmed the diagnosis. The anterior roentgenogram showed a triangular light zone. Lower down and somewhat lateral to the midline a contrast streak was noticed. It appeared as a sharply defined dark ring the outlines of which corresponded to the level of the fracture and of the broken spinal segment. Oblique views sometimes aided in the diagnosis but were not essential. Often only one vertebra was involved generally the first thoracic. If no neurotic complications occurred the symptoms diminished in a few days and gradually disappeared. As a rule the healing occurred as a pseudarthrosis or by means of a connective tissue bridge. The disability lasted from one to nine weeks averaging twenty-eight days.

In the treatment it is of greatest importance not to disclose the true diagnosis to the patient as the

mination of the treatment and the return of weight-bearing ability, as well as after the disappearance of circulatory disturbances, the patients received normal, solidly constructed shoes with Euplan arches, constructed according to the specifications of Lettermann. Although the serviceability of these is not beyond criticism, they are extremely good for calcaneus fractures, since in this type of fracture a secondary reduction due to final pathological bone and joint malposition does not come into question. The average duration of hospital treatment amounted to one and four-tenths months, and the average ambulatory treatment of all cases, also of those cases treated first in the hospital, was four and one-half months, in the latter group of cases the ambulatory follow-up treatment lasted four and four-tenths months, whereas in the cases treated entirely in the ambulatory clinic the duration of treatment was five months. A permanent disability compensation was received by 5.9 per cent of the patients with fractures classified as Grade 1, fissures, infractions, and sprained fractures, by 9 per cent of those with fractures of Grade 2, horizontal, longitudinal, and oblique fractures without deformity, and by 16.4 per cent of those with fractures belonging to Grade 3, compression or shattering fractures with severe deformity. Diagnosis without roentgen-ray examination may be extremely difficult. The films must always be taken from several angles.

(BLUMFENSAAT) HARRY A. SATZMAN, M.D.

Lagomarsino, E. H. Treatment of Serious Fractures of the Os Calcis (A proposito de las fracturas graves del calcaneo) *Rev de ortop y traumatol*, 1937, 6: 365

The author reports the results of 52 fractures of the os calcis treated during the last four years.

Under spinal anesthesia a Kirchner wire was inserted through the os calcis and one through the base of the metatarsals. The patient was placed on a Boehler traction frame and a 3-kilogram weight applied. Force was applied to the os calcis and the lateral displacement of the fragments corrected.

The longitudinal arch of the foot was corrected by manipulation, then a cast was applied from the ankle joint to the toes, transfixing the wires. The traction remained for twenty days. At the end of forty days the wires were removed, the cast

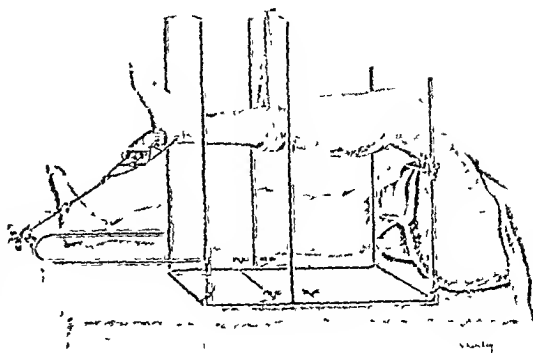


Fig. 1 Position for the reduction of fractures of the os calcis

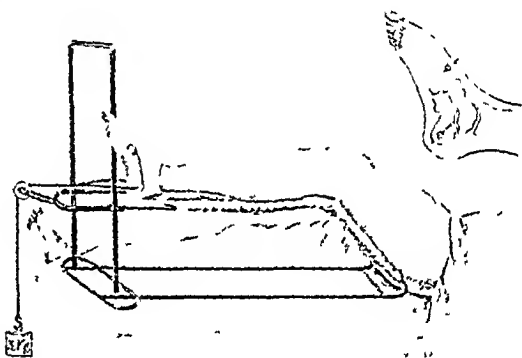


Fig. 2 After reduction. Control with plaster cast shoe and traction

was changed, and the patient permitted to bear weight. The arch of the foot had to be well molded. In from sixty to ninety days physical therapy was begun and the patient wore a shoe with an elevated arch support.

The results from this method of treatment were excellent. Numerous films taken before and after reduction confirm the author's statement.

CARLO S. SCUDERI, M.D.

performed the wound was packed with vaseline gauze and a cast was applied.

Finally there was 1 case of traumatic amputation. In this case maggots were applied immediately.

In acute cases with avulsion and in chronic cases the maggots were placed in the wound with sterile swabs without any preliminary measures. In acute cases without avulsion or in postoperative infections the wounds were irrigated with a 1:50 dilution of tincture of iodine in 0.9 per cent sodium chloride. The wound was then irrigated with a sterile about 0.25 per cent suspension of calcium carbonate and the maggots were applied.

Enough maggots were applied to cover comfortably the surface of the wound. After experimenting with various types of cages it was found that the best results were obtained by packing the wounds lightly with gauze after inserting the maggots. The entire wound was then covered with fluffed gauze held in place with bandages. Cellulose cotton pads were then placed over the dressing.

Maggots reach full growth in two or three days. Dressings were changed daily or every other day and a fresh supply of larvae added on all cases which were in the hospital. The full grown maggots crawled out of the wound to pupate and were caught in the gauze and easily removed. It was important to keep the exposed bone, fascia or muscle from drying. This can be done by covering the areas with glucose or urea crystals. As soon as the entire surface responds with healthy granulations the wound should be prepared for skin grafts by warm soaks or Dakin's solution.

Of the 44 patients treated 32 presented healed lesions. 4 are under treatment. 1 was lost. 5 underwent amputation and 2 died. The deaths were due to general septicemia. The amputations were performed because of gross loss of bone and soft parts in 3 cases because of choice in the presence of non-union and because of malignancy.

The time of treatment with maggots varied from twenty-five to one hundred and thirteen days and the total time of treatment from one hundred and sixty to seven hundred and forty-three days.

The advantages of maggot treatment are the rapid debridement of necrotic material, the discovery of hidden sequestra and pus pockets, shortening of the hospitalization and early rehabilitation. Chronic suppuration following infection of compound fractures or open operation should not occur. Adequately treated septic compound fracture of the tibia once healed stays healed.

HAWTHORNE C. WALLACE, M.D.

Bode P. Fracture of the Os Calcis: a Typical Injury in Building Construction Workers. Experience with 230 Fractures of the Os Calcis (Der Fersenbeinbruch—eine typische Verletzung des Bauarbeiters). *Erfahrungen an 230 Fersenbeinbrüchen*. *Arch f orthop Chir* 1937 37: 649.

The special working conditions of the building construction trade give rise to a great number of

injuries resulting from falls and crashes. For this reason fractures of the os calcis are frequent. This report is based upon 230 cases which were treated during the course of seven years. As up to the present time there has been no study involving such a large number of cases of fracture of the os calcis, a somewhat detailed discussion is justified. Ninety-six per cent of the injuries resulted from a fall, 4 per cent were the result of direct trauma. The average height of the fall was 3 meters, the greatest 9 meters, and the smallest 1 meter. The average age of the patients was forty-four years and the ages varied from fifteen to sixty-nine years. One hundred and twenty fractures involved the right foot, 93 the left and 17 were bilateral. In 108 cases the injury was a pure compression fracture, in 28 the fracture was horizontal in its course and in 35 it was diagonal. In 25 cases there was infraction and fissure for the most part only in the peripheral layer, in 16 cases there was a lateral tearing away, tearing of muscle insertions and tearing out of the Achilles tendon insertion. Complications of fracture of the os calcis in the sense of simultaneous injury of other bones or subsequent thromboemboli and emboli were observed in 39 cases. Every severe os calcis fracture especially when associated with simultaneous fracture of other bones deserves hospitalization. The fractures of Grades 1 and 2 in the classification following are best managed by ambulant treatment. Even more severe compression and splintering fractures can be treated conservatively in the manner if it is believed unlikely that more extensive measure will be required. The late results in this type of fracture are also satisfactory. Ninety-one of the less severe cases were treated conservatively. In this group the best results were obtained following the application of a well padded walking cast combined with a rubber or with a metal walking iron which was covered with wood and used for a period of six weeks. The next best results were obtained in those cases in which a removable U-splint without a metal walking stirrup was used. The latter type of dressing permitted the use of functional and physical methods of treatment immediately. The follow-up treatment is similar to that described in the cases of os calcis fracture which were treated by hospitalization.

The 139 cases which were at first treated in the hospital and later in the ambulatory clinic were handled by the most variable methods. Data are presented concerning the results obtained in the groups treated according to the various methods and the amount of disability compensation which the patients obtained. The weight bearing and walking ability can be restored at the termination of the treatment or even during the course of the latter by the employment of suitable orthopedic measures. In this respect cognizance must be taken of the fact that the largest number of the complaints have their origin in the lower ankle joint which is involved in some manner in every marked calcaneus fracture.

The author recommends a procedure which proved satisfactory in the last 41 cases treated. After the

obstruction and to the reaction of the sympathetic nerve, which produces a vascular spasm, especially in the region of the embolus and below it. However, if the embolus is small and not infected the symptoms may subside as the collateral circulation becomes established and maintains the blood supply not only of the extremity, but also of the artery itself below the point of obstruction. In such cases the arterial obstruction may be incomplete or the embolus may not be firmly fixed and may migrate into the branches of the artery primarily involved.

But in the usual type of arterial embolism the pathological changes and resulting symptoms are progressive. The embolus, especially if infected, produces lesions in the arterial wall, these lesions do not involve the inner layers of the arterial wall so much as the adventitia. The intima shows some pathological changes, it is true, but the pathological changes in the adventitia are always more advanced, even the sheath of the artery may become involved. The sympathetic disturbances are aggravated.

Below the embolus the collateral circulation cannot maintain the normal flow of blood. Both the pressure and the speed of the blood flow are diminished, this results in extension of the clot, which thus obliterates a considerable segment of the artery and may destroy the function of a number of the collaterals. The lesions may become organized into a hard sclerotic block, but the symptoms persist, except in the case of "abortive" embolus, because of the reduction of the blood supply and defective circulation. The irritation of the sympathetic nerve plexus also persists, and it may be necessary to resect the entire obstructed vascular area. If the patient has an aneurysm or severe cardiac disease, the initial cause of the formation of the embolus, there is always danger that another embolus will form.

ALICE M MEYERS

Funck-Brentano, P.: Arterial Emboli of the Extremities; Treatment (Les embolies artérielles des membres. Traitement) *J de chir*, 1937, 50 433

Funck-Brentano notes that recent studies, especially those of Leriche, have shown that the arterial vascular system is not passive, and the effect of embolus is due not to mechanical obstruction alone but also to the fact that the thrombosed artery affects the sympathetic nervous system. Thus two methods of treatment have been developed one which deals with the embolus itself, or anatomical method, and one which acts upon the arterial sympathetic system, or physiopathogenic method.

There are two anatomical types of treatment of arterial embolism, embolectomy and arteriectomy, the choice of one or the other depends primarily upon whether endarteritis has or has not developed. En-

arteritis develops sooner or later at the site of the clot, and this is the area where a secondary thrombus is formed. It develops earlier if the clot is large or infected than if it is small and aseptic. The possible prolongation of the clot and its extent must also be considered in operations of this type.

In the treatment of embolism early and exact diagnosis is indispensable. The chief symptoms of arterial embolism of an extremity are sudden pain and pallor, and coldness and loss of cutaneous sensation in the limb below the embolus. Eventually gangrene develops. Embolism must be differentiated from phlebitis and arteritis. In cases in which there is doubt in regard to whether embolism or arteritis with obstruction due to arteriospasm is the cause of the symptoms, the acetylcholine test should be used, as this drug acts quickly on arterial spasm. In the larger arteries the site of the embolus can usually be determined by the clinical findings, such as the site of the pain, the changes in temperature, the signs of ischemia and arterial pulsation. In the cases of embolism in the smaller arteries, arteriography must often be done for the exact localization of the embolus, this procedure also has the advantage of showing the condition of the collateral circulation.

Of the various surgical methods of treatment, embolectomy is suitable only for those cases that can be operated upon within the first ten hours after the formation of the embolus. When this operation is performed this early it has often given remarkably good results.

After the tenth hour, arteriectomy is the treatment of choice, the resection of the artery should include the entire area that is in contact with the clot, and the adventitia should be removed. In cases of chronic embolism, previous removal of the embolus is not necessary, but in cases of acute occlusion by an embolus, a preliminary embolectomy should be done. Only in this way can the true conditions within the artery and the extent of the arteritis be determined. Arteriectomy results not only in the removal of the mechanical obstruction, but also in the removal of the focus of irritation of the sympathetic nerves, and, therefore, in the improvement of the collateral and peripheral circulation.

Operations on the sympathetic nervous system at a distance from the site of arterial obstruction and treatment with drugs, which also act upon the sympathetic nervous system, are not effective in the relief of arterial obstruction from an embolus. The use of such drugs, however, is often a valuable adjuvant to the operation of arteriectomy, for this purpose, the author prefers papaverine and acetylcholine, both given by intramuscular injection. Cardiac stimulants, such as digitalis, coramin, or camphor, may also be indicated according to the conditions in each case.

ALICE M MEYERS



SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Liedtke F W Late Results of Traumatic Injuries to the Vessels (Ueber Spätfolgen traumatischer Gefäßschädigungen) *Arch f orthop Chir* 1937 38 114

Temporary disturbances of the circulation frequently follow accidental injuries. The reasons for this are not wholly clear least of all in the case of chronic disturbances or so called traumatic edema. Investigations have indeed shown changes in the way of increased permeability of the vessels, and thrombus and aneurysm formation all of which would give rise to disturbances of the circulation. It apparently makes no difference whether a venous or an arterial vascular region is mainly involved in the injury. It is much more difficult to explain the cases in which the disturbances appear as late results after smooth healing of the immediate effects of the injury. When persons with such disturbances complain or present traumatic edema they are often regarded as malingerers who have artificially produced in themselves the outward appearance of internal injuries or as neurotics. In coming to such a conclusion one should exercise great caution for histological investigations on amputated limbs have thrown light on such complaints. In 1932 Braeuner reported two typical cases with complete case histories and came to the conclusion that the trouble was a traumatic arteritis. In these cases the changes were in the arteries affected by the trauma while the veins were wholly uninvolved.

Takobi Cerish and Schaer and Neff have investigated the condition called traumatic arteritis. Liedtke reports 2 cases in which chronic edema appeared in one case immediately following and in the other case not until four weeks subsequent to a slight contusion but undoubtedly in consequence of the contusion. These cases did not come to amputation. In a third case an abnormal reaction of the peripheral vessels was found to be caused by heating of the skin and mechanical irritation acting on the entire body. In 2 further cases not only a chronic edema but a gradually developing gangrene with intolerable pain which necessitated amputation followed injury in one case without an interval in the other case in the course of seven years.

Interesting facts were brought out by the histological examination. In both cases there was found a much canalized thrombus of the arteria dorsalis pedis and vessel changes both proximal and distal to but never far from the site of injury otherwise the vessels were intact. One point was particularly interesting in both cases there was a circumscribed defect of the intima. In the opinion of the author this points to the site of origin of the thrombus. He could discover no signs of inflammation. The

cells in the media which Braeuner held to be an indication of inflammation are believed to be 'abraumzellen' by Liedtke.

(FRANZ) FLORENCE A. CARPENTIER.

Holman E, and Schulte T L The Treatment of Peripheral Vascular Disease by a Suction Pressure Chamber Applied to the Thigh *Surgery* 1937 2 502

The authors note that because suction on an obliterated rigid vascular tree cannot increase the blood supply unless there are available less rigid and less obliterated channels capable of responding to external influence the results of improving peripheral circulation by alternating pressures are not always as permanent as might be desired. Moreover unless the tissues are soft and pliable the influence upon deeper structures and larger deeper vessels is minimal. The description of a suction pressure chamber designed by these workers to offset disadvantages of other available apparatus is given in detail. The methods of treating patients and the observations made during a series of treatments are recorded.

From their experience with the suction pressure chamber applied to the thigh the writers find that it exerts its influence on vessels which are still patent and pliable instead of upon an obliterated or practically obliterated arterial bed. The former vessels are capable of responding to external influence whereas the latter may not be.

The suction pressure chamber can be applied in the presence of infection upon the foot without danger of spreading such infection by active massage. The healing of indolent previously recalcitrant ulcers has been achieved under its treatment.

The thigh chamber proved its effectiveness in a case previously treated without benefit by the Pavaer boot. It is applicable when the Pavaer boot cannot be used because of the unbearable pain produced by the active massage of inflamed tissues.

The suction pressure chamber is a peripheral or accessory 'boot'. During the negative pressure phase it draws blood into the thigh and during the positive phase it forces the blood into the peripheral vessels. It is applicable in obliterative vascular disease whether due to thromboangitis or to arteriosclerosis.

HERBERT F. TUCKERSON, M.D.

Fiolle J Arterial Emboli of the Extremities A Pathological Study (*Les embolies artérielles des membres*) *J de chir* 1937 50 450

Fiolle notes that arterial emboli may form without producing the typical clinical syndrome in some cases the initial symptoms are those of embolism but they subside in others the symptoms are never typical. He reports 2 cases of each type.

In the cases of the first type the abortive embolus the initial symptoms are due both to the

ment. Consequently the prevailing assumption of the specific and predominant importance of the vitamin content in cod-liver oil for wound healing remains doubtful.

Photographs, tables, and a bibliography accompany the article
M. E. Morsr, M. D.

ANESTHESIA

Woodbridge, P. D.: Metycaine Spinal Anesthesia
Am J Surg, 1937, 37 191

Metycaine is a water-soluble white powder which is not affected by air or sunlight. It is faintly acid, self-sterilizing, and does not deteriorate by autoclaving or any other form of sterilization. A skin wheal raised with a 1/16 per cent solution of metycaine lasted fourteen minutes as compared to the five minute skin anesthesia with a similar concentration of procaine. A 1/128 per cent solution of metycaine has anesthetic properties despite this great dilution. Metycaine is pharmacologically compatible with epinephrine and is superior to procaine for local anesthesia and topical application.

Metycaine can be obtained in 2 c cm ampoules of 10 per cent aqueous dilution. When it is mixed with spinal fluid, it is heavier than the spinal fluid. Within the first fifteen minutes after injection, the height of the anesthesia can be controlled by the slope of the operating table. After spinal puncture, the spinal fluid is aspirated into a syringe which contains the proper dose of metycaine, and is slowly re-injected into the subarachnoid space without barbotage. The quantities of metycaine used for various operative procedures are as follows:

For anesthesia of the perineum, from 0.4 to 0.8 c cm of 10 per cent metycaine diluted with from 1.5 to 3 c cm of spinal fluid, with the table level.

For anesthesia of the lower abdomen, from 0.8 to 1.4 c cm of metycaine diluted with 5 c cm of spinal fluid, with the head of the table tilted down 10 degrees.

For anesthesia of the upper abdomen, from 1.5 to 2 c cm of 10 per cent metycaine diluted with 5 c cm of spinal fluid, with the table inclined from 10 to 20 degrees.

In all cases, after the anesthetic height is reached the table is leveled. In this way, the anesthetic

agent cannot travel cephalad by gravity. If the blood pressure falls to 50 per cent below its pre-anesthetic level, 0.2 c cm of 1 to 1,000 epinephrine solution is given intramuscularly. Respiratory embarrassment of any type is treated by the administration of oxygen by the closed method.

Spinal metycaine was administered in 1,381 cases. Of these, 70 per cent were treated by abdominal operation, which was confined to the upper abdomen in 21 per cent. Twenty-seven children between the ages of five and fourteen years were operated upon under spinal metycaine. They were given 1 mgm. per pound of body weight. Twenty-nine patients, more than eighty years of age, also received metycaine intraspinally. Six per cent of the total number of patients were classified as poor surgical risks and were given this anesthetic. The author believes, however, that poor risk patients should be given anesthetics other than spinal. The anesthesia was satisfactory in 90 per cent of the cases. In 99 per cent of the cases the anesthesia lasted over sixty minutes, and in 51 per cent the anesthesia still existed after one hundred minutes. Metycaine anesthesia wears off gradually, without the abrupt change to muscular rigidity which is so characteristic of procaine. An extremely great fall in the blood pressure was noted in 11 per cent of the patients, respiratory paralysis was present in 5.3 per cent of all patients, and retching and vomiting occurred in 3.2 per cent. However, the latter complication is not an index to the toxicity of the drug.

With regard to the immediate complications, only 3 patients had convulsions and 1 had a complete respiratory paralysis. The author believes that the 5 per cent respiratory and circulatory complications are dependent on the site and duration of the operation, as well as upon the age of the patient and the nature of the disease process. Neurological complications such as headache, anesthesia, hyperesthesia, backache, and weakness of the lower extremity constituted a very small number—only 2 per cent. Most of the neurological complications were purely functional and related to other etiological factors, such as extreme plantar flexion caused by tight bed clothes.

BENJAMIN G. P. SHAFIROFF, M. D.

SURGICAL TECHNIQUE

ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Huzella T. The Micromechanical Basis of Wound Healing (Vikromechanische Grundlage der Wundheilung) *Arch f Klin Chir* 1937 188 471

The author seeks to fill in the gaps in our knowledge concerning the interpretation of the processes of wound healing by evaluation of his experiences with tissue cultures and the artificial production of filamentous structures. Following discussions clarified by photomicrographic pictures but not suitable for a short report the author comes to the conclusion that fibrin which arises from the bleeding or from the inflammatory exudate plays an important rôle in the primary provisional agglutination of the wound edges. This fibrin undergoes colloidal changes the nature of which are not yet definitely known. In the later constructive phase of wound healing the elementary argyrophilic fibrous system is of basic significance in the formation of granulation tissue. It arises from the edematous collagen fibers present in the acid medium of the areas of inflammation and under the proper chemical requirements it takes form depending upon the lines of force of the tension of the wound and also according to the pulling forces of the cellular activity. This thus becomes the basis of the elastomotor micro-mechanism which is active in the arrangement of the granulation tissue in the cellular activity and in the blood circulation between the latter and the regions surrounding the wound and in the periodical process of the drawing together of the wound edges. The progressively more intimate relationship between the connective tissue system of the wound surroundings which at first is separated from the granulation tissue is brought about by the very lively cellular interaction. In the course of infiltration the granulation tissue is thus brought into the structural and functional unity of the organism. The active wound healing comes to a stop when the final scar has been formed. The difference between the theory of cellular pathology of Virchow and that of the molecular pathology of Schade is thus equalized to a certain degree by the union of the histological and colloidal chemical viewpoints into a uniform evaluation of the relationship between the cells and the fibrous system into a sort of intercellular pathology.

(HEINRICH CALEDER) HARRY A. SILZMAN, M.D.

Pozzan A. The Influence of Cod Liver Oil Ointment on Cicatrization (Influenza della pomata all'olio di fegato di merluzzo sull'evoluzione del processo di cicatrizzazione) *Arch ital di chir* 1937 46 450

Pozzan reviews the literature on the effect of vitamins and particularly cod liver-oil ointment on the healing of wounds, burns, fractures and suppurative

foci. Uncertainty still remains as to whether the recognized stimulating action of the ointment is due to the vitamin content or partly to other substances in the oil the biological effect of which is undefined. Hence the author investigated the antiseptic action of the ointment and its separate components *in vitro* the clinical effect on healing of wound in rabbits and mice and the histology of the reparative processes. His studies are the first made on the last subject. He performed control experiments to determine which of the components was responsible for its action.

The results showed that *in vitro* the action of the crude or the devitaminized oil on staphylococci and colon and proteaceous bacilli differs according to the age of the culture. For young cultures the oil is mildly bacteriostatic and for old cultures definitely bactericidal. Dilutions of the oil in vaseline are less effective and vaseline alone is negative.

Numerous animal experiments with suitable controls showed that the oil dissolved in vaseline in the proportion of 1 to 3 hastened the healing of external wounds. The action was most marked in extensive and deep lesions involving much loss of tissue and was increased when they were protected by a layer of gutta serena and a plaster bandage and the ointment was applied on alternate days for not too long a period. Although infection occurred it was mild and localized.

The lesions treated with the ointment presented characteristic macroscopic and microscopic features. There was no sharp demarcation between the margins and base because of the rapid and uniform, distributed development of granulations in the center and the simultaneous extension of a continuous uniform epithelial layer from the periphery. No crust was formed. Reticulo-endothelial cells predominated over fibroblasts in the granulations and polymorphonuclears were scarce. The capillaries proliferated actively and there were numerous blood and lymph sinusoids. At twenty days continuity of the epithelium was reestablished with differentiation of the dermal and hypodermal layers and the beginning of hair follicles.

Vitamins A and D dissolved in vaseline retarded healing as did vaseline alone. An ointment of cod liver oil devitaminized by heating and vaseline influenced cicatrization favorably although more slowly than the normal oil.

Apparently from the above experiments the action of the oil is both antiseptic and stimulating. The antiseptic property is due to thermostable substances the stimulating to both thermostable and thermolabile substances. The lack of stimulating power in Vitamins A and D supported in vaseline and the mildly stimulating and bactericidal effect of the devitaminized oil would exclude the vitamins as the chief source of the beneficial effects of the ointment.

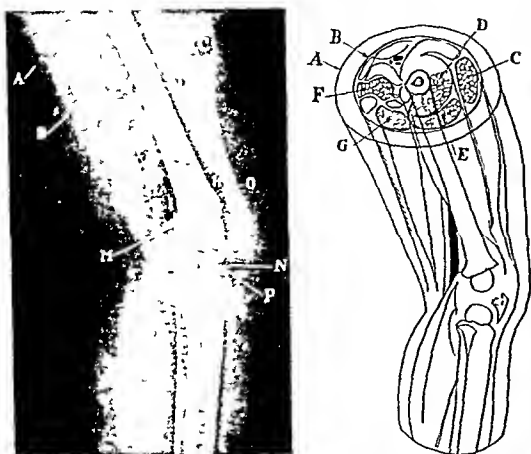
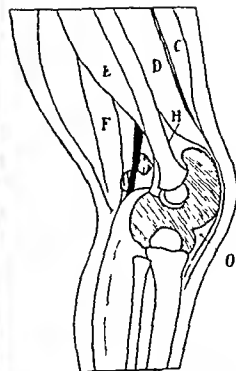


Fig 1 Roentgenogram of the soft parts of the knee in a two-year-old child A Skin and subcutaneous tissue B Aponeurosis of the thigh C Rectus anterior (rectus femoris) D Rectus femoris intermedius (rectus femoris) E Vastus lateralis F Semimembranosus G Long head of the biceps H Retroquadriceps, radiotransparent space I Popliteal adipose triangle L Arteriovenous vascular bundle M Insertion of the gastrocnemius and posterior capsular recess N Subpatellar adipose cushion O Quadriceps tendon P Patellar tendon



Fig 2 M Posterior synovial recess distended by the effusion X Subquadricepsal recess is distended by the effusion and presents a well delimited contour



series of concentric cylinders of varied structure and density having in their center a skeletal segment. The aponeuroses, muscles, tendons and even the blood vessels can be visualized in contrast with the adipose and areolar tissue which holds them together and forms a plane of cleavage between them.

John and Carty claim that it is possible to observe the course of the nerve especially in the popliteal region, but they have been unable to demonstrate it. Neurography, in the author's opinion, is only possible following the injection of a contrast substance into the perineural sheath.

The author subsequently describes the normal anatomy of the soft parts of the knee as it is seen in these roentgen pictures.

Concerning the pathological conditions, Bonola states that practically all the lesions of the knee may produce grave alterations of the fine structure of the soft parts either directly, by effusions or infiltrations of the capsuloligamentous structure or indirectly, in the form of a muscular atrophy or mechanical compression.

Among a series of various pathological conditions Bonola shows a tuberculous effusion into the knee joint characterized by the distension of the subquadricepsal space in a two-and-one-half-year-old child (Figure 2).

Figure 3 represents a tuberculous arthrosynovitis and Figure 4 shows the roentgenological aspect of a



Fig 3 Tuberculous arthrosynovitis in an eighteen-year-old girl X Subquadricepsal recess distended by the exudate M Posterior capsular recess considerably distended by exudate

Fig 4 Arthritis deformans in a forty-year-old woman, showing marked atrophy of the soft parts and calcification of the posterior capsular recess M

case of arthritis deformans with marked atrophy of the soft parts and calcification of the posterior capsular recess.

The author concludes by stating that this method may prove to be of considerable aid in diagnosis, and that its application should also be attempted in other articulations which present a more complex anatomical structure.

RICHARD E SOMMA, M D

PHYSICO-CHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Farberov B J Roentgenological Diagnostics of the Foramen Opticum *Acta radiol* 1937 18 594

The author briefly reviews the literature on the subject of radiological investigation of the optic foramen. In the visualization of this structure he prefers a modification of the technique of Gosselin. The patient is placed face downward on the proper cheek. The head is turned aside to 52 degrees with the aid of an angle gauge. The exposure is made at a focal distance of from 52 to 60 cm. The following changes were found in various combinations:

- 1 Alterations in the form of the foramen due to
 - a Congenital deformation
 - b Acquired deformation
- Alterations in the dimensions of the foramen
 - a Enlargement of the channel lumen
 - (1) Proportional with retention of the original form
 - (2) Non proportional
 - b Decrease of the dimensions
 - (1) Circular
 - (2) Flattening of one diameter
- 2 Alteration of the outline of the foramen
 - a Thinning
 - b Partial or general thickening
 - c Breaking of the continuity of the outline
 - d Sclerosis in the floor for the arteria ophthalmica
- 3 Complete destruction of the optic foramen
- 4 Alteration in the channel lumen (vertical or horizontal strip of calcification separating the lumen into two parts)
- 5 Alteration of the small wing of the sphenoid
 - a General thickening and condensation
 - b Pneumatization of the anterior clinoid process
- 6 Alterations of the sphenoid sinus and posterior cells of the ethmoid
 - a Diffuse shading



Fig. 1 Unilateral darkening of one half of the sphenoid sinus, of the posterior cells of the ethmoid labyrinth and of the antrum of the maxilla. Operation revealed a cystic mass localized in the adjoining cavity.

- b Sclerotic cavities
- c Distinctly confined shadows of tumors of rhinogenic origin
- 4 Alterations of the external orbital wall
 - a Thickening by perostosis
 - b Slot shaped and channel shaped defects
 - c Fissures fractures

Alterations of this type were observed in 1 per cent of 400 patients whose optic foramen was examined for one reason or another. In 8 1/2 per cent of the investigated cases the normal picture of the foramen was of value in the diagnosis particularly for the localization of the eye condition. The examination was particularly valuable in cases of retrobulbar neuritis, choked discs, optic nerve atrophy, exophthalmos, trauma in the orbital region and some indistinct visual disturbances.

The author concludes that examination of the optic foramen should be made more often. The foramen is accessible to any roentgenologist, but the examination requires strict adherence to a special technique. The interpretation of the roentgenograms demands a knowledge of the numerous wide variants of the norm. Comparative studies of both foramina is important. *H. KOTLOV C. OCHENKOV MD*

Bonola A The Radiological Interpretation of Normal and Pathological Shadows of the Soft Parts of the Knee without Contrast Substances (Sulla interpretazione radiografica delle ombre normali e patologiche del e parti molli del ginocchio senza mezzi di contrasto) *Chir. d. organ. di movimento* 1937 23 39

Bonola states that the study of the shadows of the soft parts of the knee constitutes an unexplored field up to this date. Exact anatomical and pathological information is often necessary for diagnosis and can be obtained relatively simply by the following radiological procedure.

No special technique is required and the usual radiological material of the clinic is used for the illustrations. The knee should be exposed in frontal view and in profile at a flexion of about 140° and at a focal distance of 120 cm. For children the time of exposure varies between one and two minutes. The maximal tension employed was 50 kv with an intensity of 80 ma. A double reinforced screen and an ultrarapid film were used. For the adult the time of exposure ranged from two to three minutes with a maximal tension of 60 kv and an intensity of 80 ma. A double reinforced screen, an ultrarapid film and a Potter Bucky diaphragm were employed.

Figure 1 shows the picture of a film obtained according to this technique with a schematic interpretation of the shadows of the soft parts of a normal knee of a two-year-old child.

The author states that in general the distribution of the soft tissues in the knee may be compared to a

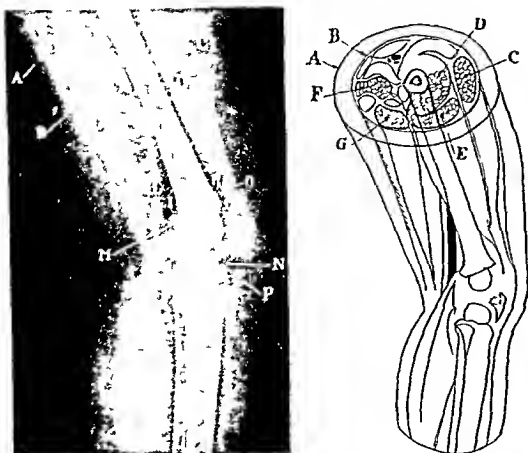


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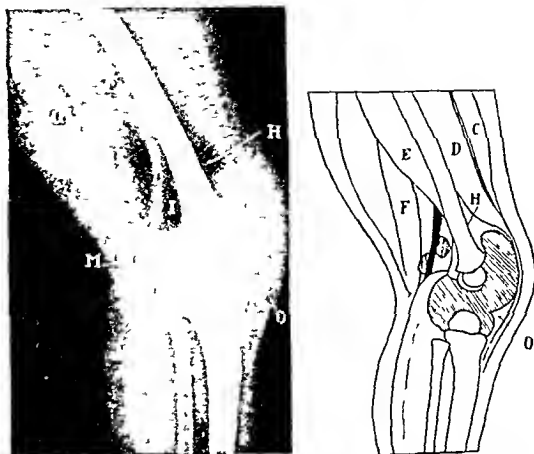


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scirrhous The overlying skin is usually movable, but may be adherent, and is often a deep pink or violaceous color, pigmentation is rarely seen, ulceration is fairly common in lymphoma and leucemia, but is rarely seen in other secondary skin tumors

Metastases to the skin occur more often than has been supposed In an autopsy series of 2,298 malignant tumors of various types, 27 per cent had metastases to the skin The importance of metastases of the skin lies in the fact that they are not uncommonly the first evidence of the existence of malignancy and also of metastasis Contrary to current belief, metastases to the skin do not always herald approaching death, but may precede the terminal event by months or even years They are of limited value in prognosis since the behavior of the skin tumors does not necessarily indicate the rate of growth of the primary tumor

JOSEPH K. NARAT, M D

Eggers, C.: *Cancer Surgery Ann Surg*, 1937, 106 668

The author believes that irradiation is not the great panacea for cancer which it was originally proclaimed to be, he recognizes it as a valuable adjunct to surgery He emphasizes the fact that many among the public who know or suspect that they have cancer fail to seek early surgical advice on the theory that cancer is an incurable disease It is important that the pessimistic attitude of the public, as well as of medical men, prevailing at the present time, be superseded by a sane optimistic viewpoint

It is emphasized that enlargement of lymph nodes draining a certain cancerous area does not necessarily mean involvement Frequently, such enlargement is due to absorption of infectious material from an ulcerated lesion, rather than to invasion with cancer cells It is a common observation, on the other hand, that nodes are frequently involved without being palpable before operation If the primary lesion is removable, it is operable regardless of enlarged regional nodes, unless there be contra-indications, such as distant metastases or constitutional disease An attempt should always be made to remove the primary lesion with the entire drainage field and its enlarged lymph nodes in one piece

Several factors operate to bring about favorable results (1) early diagnosis, (2) a favorable tumor (one which is not very cellular and consequently has little tendency to metastasize, or one that is radio-sensitive), and (3) radical surgery performed with meticulous and painstaking care, with an attempt to remove the surrounding tissue well beyond the tumor and its local extensions, as well as the complete lymphatic drainage area

The author discusses his own results and those reported in the literature of various methods of treatment of cancer in different locations He discusses the best surgical procedures in various types of growth Of 21 patients with carcinoma of the sigmoid, he found 76 per cent to be operable, 31 per cent of those operated upon survived for five years

Of 63 patients with carcinoma of the stomach, 44 per cent could be treated by resection, and in 33 per cent he obtained a five-year cure These figures are in fair agreement with the findings of Balfour, who reported resection in 45 per cent of 4,793 cases, and obtained five-year cures following lymph-node involvement in 18 per cent, and five-year cures when there had been no lymph-node involvement in 48 per cent

With the present state of our knowledge concerning intra-oral cancer, radical block dissection of the neck offers the patient the best chance of cure The primary lesion should be removed first With regard to cancer of the breast, the author reports a five-year follow-up of 95 per cent of 76 cases Of the patients without lymph-node involvement 65.4 per cent survived five years, and of those with lymph-node invasion, 33.3 per cent survived five years In the total group the five-year survival was 43.8 per cent

The author believes that surgical treatment should be stressed in all those lesions which from the best combined surgical experience have been found to give better results with a carefully performed operation than with other forms of treatment It should also be employed in all those lesions that may yield to irradiation, in which the results of treatment as regards pain and tissue damage are such that the patient is left in a worse condition than after surgery The author believes that a combination of irradiation treatment and surgery should not be deliberately planned in advance as a curative measure, since in his opinion, it tends to encourage incomplete surgery

HAROLD C. OCHSNER, M D

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Schulten, H.: *The Problem of Sepsis (Zur Sepsisfrage) Med Welt*, 1937, 1 633

Schulten endeavors to outline a more definite conception of sepsis Lever wants to exclude this conception of sepsis as it does not conform with the classical interpretation of the subject, but the author considers this opinion as an evasion of terminology It is wrong to classify sepsis as being equivalent to toxemia Every febrile angina and every febrile furuncle produces general toxic symptoms Regarding sepsis and bacteriemia as synonymous is also untenable Bacteria are often found in the blood, even in harmless inflammations, without producing any general symptoms We must adopt Schottmueller's definition sepsis is present when the germs from an infective focus are constantly present or are regularly occurring in the blood coming from either a suppurative thrombophlebitis or a lymphangitis Therefore, he differentiates between a sepsis thrombophlebitica and a sepsis lymphangitica Metastases are rather unusual in comparison with the occurrence of bacteria flooding the blood, the proportion of the two conditions is 1 to 500 When merely a local metastasis occurs, it cannot be considered a sepsis Local infections with occasional bacteriemia must be definitely differ-

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Menville J G and Archinard J J Skin Eruptions in Patients Receiving Sulphanilamide *J Am M Ass* 1937, 109 1003

Four cases are reported in which there developed annoying but apparently not serious skin symptoms following the administration of sulphanilamide namely maculopapular eruptions with intense itching over areas of the skin exposed to the sun. In one case the rash was associated with severe chills, fever and a leucocytosis. In all the cases the rash and its associated symptoms disappeared within several days after the drug was discontinued.

The cutaneous eruptions are more likely to occur in patients receiving large doses of sulphanilamide when they are exposed to constant rays of the sun. SAMUEL KERN, M.D.

Goodman M H and Levy G S Eruption During the Administration of Sulphanilamide *J Am M Ass* 1937 109 1009

Two cases of toxic erythema of peculiarly limited distribution developed in the course of treatment with standard maximum doses of sulphanilamide. In one case there were hemorrhagic lesions indicating probably that sulphanilamide has vasculotoxic properties.

It is possible that the eruptions represent an allergic cutaneous reaction to the drug.

Unless one is dealing with acute infections the dose of sulphanilamide should be kept within moderate bounds. SAMUEL KERN, M.D.

Bucy P C Toxic Optic Neuritis Resulting from Sulphanilamide *J Am M Ass* 1937 109 1007

A toxic optic neuritis or a toxic neuritis of any other nerve has not previously been reported to occur in man as a result of the administration of sulphanilamide or of any of the related drugs.

A girl with osteomyelitis of the ilium was given sulphanilamide on three different occasions. On each occasion toxic manifestations appeared: headache, cyanosis, diarrhea, a choking sensation on the first two occasions, and a severe loss of vision due to toxic optic neuritis on the last occasion. The symptoms rapidly subsided after withdrawal of the drug.

It is likely that the simultaneous administration of ferrous sulphate with the sulphanilamide contributed to the patient's intolerance for the latter drug.

SAMUEL KERN, M.D.

Mottram J G The Production of Epithelial Tumors by Irradiation of a Precancerous Skin Lesion *Am J Cancer* 1937 30 746

Cramer reported that the administration of a large dose of radium to precancerous lesions in mice

produced an inhibition or delay in the development of malignancy. The author suspected that the rays had actually destroyed the epidermis and in order to investigate the problem 40 mice were subjected to benzyrene in benzene for seventy five days and varying doses of gamma rays were given. These doses however, were considerably smaller than those used by Cramer. Warts occurred much more frequently in the mice that received the greatest amount of irradiation. Malignancy occurred in the usual proportion and again most frequently in those receiving the larger dosages.

It is pointed out that this increased incidence of epithelial tumors following a non-destructive dosage of radium may be related to the clinical stimulating dose of irradiation. Of greater importance is the danger of irradiating a precancerous lesion without completely destroying it.

If these tumors which arise here and there among the epithelial cells are due to mutations produced locally by irradiation, then they should be related numerically to the dose of gamma irradiation applied and not at all to the dosage rate. Work is now under way to test out the mutation theory of cancer in this way. THOMAS L. DORRANCE, M.D.

Gates O Cutaneous Metastases of Malignant Disease *Am J Cancer* 1937 30 718

Cutaneous metastases are important because of their accessibility although this type of metastasis occurs less frequently than lymph node and organ metastases. The distribution of metastases to the skin is of interest in regard to the mode of spread and because of the relation to the primary disease. The most widely placed tumors are the lymphomas and leucemias which are more apt to be present on all parts of the body surface than other mesenchymal or epithelial tumors.

The gross appearance of skin metastases is not distinctive and they have been mistaken for such different lesions as tertiary syphilis, infected hair follicles and the nodules of parvovirus nodosa. There are however certain characteristics which are helpful in differentiating secondary carcinomatous lymphomatous and leucemic skin tumors. Secondary skin tumors of carcinomatous and sarcomatous origin are discrete rounded or oval masses. Plaque like forms rarely occur except in lymphoma or leucemia. Cancer en cuirasse which corresponds to the diffuse form of leucemia differs from the latter in that it is not a true metastasis but rather a direct infiltration of the skin from a neighboring tumor. The tumors are usually moderately firm and at first may be resilient. This is particularly true of the metastatic renal carcinomas which occur frequently in the scalp and are often mistaken for sebaceous cysts. Tumors secondary to breast carcinoma are more apt to be quite firm and

INTERNATIONAL ABSTRACT OF SURGERY

APRIL, 1938

PRINCIPLES OF SURGICAL PRACTICE THE TREATMENT OF FRESH WOUNDS

MONT R. REID, M.D., F.A.C.S., and JEAN STEVENSON, M.D., Cincinnati, Ohio

INTRODUCTION

THERE are many differences of opinion and of practice with respect to the treatment of fresh wounds. In the past and now these have undoubtedly arisen from a difference in the evaluation of the importance of the various scientific facts and observations concerning the healing of such wounds. To utilize effectively all the knowledge of fresh wounds and their healing is difficult because the overemphasis of one fact in the therapy so readily leads to a sacrifice of other important factors. For example, there was a long period when cauterization dominated the therapy of wounds until, with the help of Paracelsus and Paré, it was proved that the consequent sacrifice of other important facts of wound healing was not justified. It is now beginning to be the feeling that in the past half century the same thing has happened with respect to asepsis and antisepsis, which have monopolized the therapy of fresh wounds. If this is true, it is a duty of the medical profession to subject the present management of fresh wounds to a critical study.

Although there are apparent contradictions when one attempts to employ all the fundamental principles of wound healing in the treatment of fresh wounds, the authors believe it obvious that there must be some compromise in the use of them which will yield the best results.

Judging from past history, as well as from the multiplicity of important facts concerning wound healing, it seems necessary to guard against routines of therapy which inevitably lead to the neglect of many facts and the eventual domination of the therapy by one or two of the more important ones. It seems highly desirable to attempt to initiate a period in which doctors will

be freed from routines or fads in the treatment of wounds and will be constantly understanding and critical of the things they do to or for fresh wounds. In the hope of helping to bring about such a period we shall, in this paper, regard the treatment of fresh wounds as essentially a problem in the aid of the activity and growth of living cells which must, in the final analysis, heal the wounds, we shall endeavor to point out how the existing knowledge of wound healing may logically be applied to the solution of that problem. It is obvious that this discussion must be limited to those scientific contributions which, at the moment, appear to the authors to be susceptible of practical application. They readily acknowledge that there may now be some fundamental observations, the practical value of which they do not discern.

It appears to us advisable to list the following facts and observations which should be known by every doctor who treats fresh wounds (not more than six hours old).

- 1 The proper control of hemorrhage is essential.

- 2 Prior to the lapse of from six to eight hours the bacteria in a fresh wound may be considered as being on the surface of the wound and not invading the living tissue.

- 3 The presence of bacteria in fresh wounds may kill living tissue or seriously interfere with its healing by the destruction of the mechanical and nutritional support for the cells of repair.

- 4 Débris, blood clots, and dead or devitalized tissue markedly handicap the healing of a fresh wound and, besides, encourage tremendously the growth of bacteria and consequently the clinical signs of infection.

entiated from sepsis. Even when a local inflammation spreads continuously to contiguous tissues no sepsis can be diagnosed. Only when a larger vein or a larger lymphatic chain is involved general symptoms of sepsis are in the foreground of the clinical picture and overshadow the local focus. Sepsis is a bacterial vascular focus which must be attacked surgically. It is important to note that the sepsis focus seldom coincides with the primary focus.

Lever endeavors to separate the pyogenic infections from the anaerobic infections. This is possible in tetanus only but not in gas bacillus infections and especially not in streptococcus putrificus anaerobic infections which numerically, are scarcely less important in thrombophlebitic sepsis than hemolytic streptococcus infections. The anaerobic streptococci cause regular putrefaction in the veins as well as metastases and at the same time cause a putrid albuminous disintegration.

Regarding the metastases he points to the investigations of Nathan who claims that metastases affect only the capillary beds nearest to the septic focus, hence, in peripheral phlebitis the lungs, in pyelophlebitis the liver and only later can they extend beyond to the next capillary chain because of pyogenic thrombophlebitis of the metastases. The anaerobic streptococci chiefly cause the foul lung abscesses the hemolytic streptococci mainly produce the joint and skin metastases which are relatively benign and heal spontaneously after the removal of the focus of infection. Staphylococci tend to produce manifold metastases to numerous organs, in colon bacillus sepsis sometimes all secondary suppurations are absent. Pneumococcal infections often lead to solitary bone, joint or cerebromeningeal metastases. In addition to these naturally, there is a sepsis acuta in which section does not disclose anything excepting the inflammatory focus.

(FRANZ) MATTHIAS J. SEIFERT M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Bannick E. G. Gregg R. O. and Guernsey C. M.
The Erythrocyte Sedimentation Rate. *J. Am. M. Ass.*, 1937, 109: 1257.

The authors summarize their article as follows:

1. If the sedimentation test is to have widespread use in the physician's office as well as in the hospital the test must be simple.

2. Such a simple test is entirely adequate for practical purposes if certain facts are kept in mind. If a single reading is taken at the end of one hour a tube such as the Westergren tube which is 200 mm. tall should be used. Shorter tubes may require more frequent determinations if the true rapidity of the sedimentation process is to be determined. The tube must be kept in a strictly upright position. Anemia tends to accelerate the rate of sedimentation and allowance must be made for this fact but a routine correction for anemia in each case is unnecessary.

3. The practical value of the determination of the sedimentation rate in general medicine is threefold: (1) it indicates the presence of disease; (2) it indicates the activity and progress of diseases such as tuberculosis, pelvic inflammatory disease, acute cholecystitis, rheumatic fever, infectious arthritis, pneumonia and other thoracic infections and suppurations, Hodgkin's disease, acute febrile illnesses and acute coronary thrombosis; and (3) it aids in differential diagnosis. It is of particular value in the differential diagnosis of arthritis and in that of acute appendicitis from abdominal conditions such as acute pelvic inflammatory disease.

4. When the use of the sedimentation test is restricted to those cases in which it has its chief clinical value and when the limitations of the test are recognized it will continue to be an extremely valuable laboratory aid in clinical medicine.

Hemorrhage in a wound separates living tissues and increases the amount of work the living cells must do to breach the defect. It is a good medium for the growth of bacteria and thus encourages the development of infection. By tension it may interfere with the blood supply of living cells and retard their growth. It is, in effect, a foreign body which must be removed.

So the ideal control of hemorrhage neither permits the development of a hematoma, nor justifies the use of unnecessary ligatures or coagulation, which introduces foreign bodies into a wound, causes necrosis, and interferes with the blood supply.

CONTAMINATION VERSUS INFECTION

It is generally agreed that prior to the lapse of from six to eight hours, bacteria in a fresh wound may be considered as being on the surfaces of the wound and not invading the living tissues. If this principle is accepted and, also, our belief that all efforts to kill bacteria in a fresh wound cannot be absolutely successful and do unwarranted damage to living tissues, then it is logical to advocate the removal of most of the bacteria from the surface of the wound in a way that will do the least damage to living tissues. In the case of fresh surgical wounds we believe this can best be done by thorough irrigation with normal salt solution, in the case of traumatic wounds this may have to be supplemented by débridement and the use of white neutral soap and water in order to remove the débris introduced at the time of the accident.

BACTERIA

Bacteria in fresh wounds may grow, invade, and kill living tissues and thus seriously interfere with healing. The bacteria utilize the food intended for the growing cells and destroy the fibrinous deposits which hold the cut surfaces in approximation. The products of infection accumulate until the internal pressure breaks down any union which may have been accomplished and the wound is supported by nothing but sutures or epithelium. Pointing is the result of internal pressure necrosis and is Nature's way of draining an abscess. Should the misfortune of a wound abscess appear, a careful surgeon will detect and open it before complete solution of the tissues has again occurred.

It is obviously the surgeon's duty, first to prevent the introduction of bacteria into fresh wounds and, second, to remove as many of them as possible from the surface of the wounds. However, it is essential to remember that fresh wounds

can rarely, if ever, be made absolutely free of bacteria, we must accept the principle that their sterilization is always relative. Thus, both the asepsis and the cleansing of fresh wounds should be carried out with the idea that there will always be a few bacteria which the tissues must combat. In this connection it must always be remembered that healthy living cells have a remarkable power to kill bacteria, while dead tissues are helpless against their onslaught.

DÉBRIS, BLOOD CLOTS, DEAD OR DEVITALIZED TISSUE

Many, many times the development of clinical infection is due not so much to the few bacteria which healthy living cells could have handled, but rather to the débris and necrosis left in the wound or produced by the surgeon's roughness, the necrotizing effect of too many tight sutures and ligatures, or the use of germicides which may have destroyed countless invisible delicate living cells. This delicious bacterial food of débris and dead or devitalized tissue is frequently the kindling for a conflagration which need never have occurred. Yet bacteria receive the blame and the conscience of the doctor goes free.

Even if clinical infection does not occur, dead tissues, débris, and blood clots divert the energies of living cells from the problem of repair to the elimination of foreign materials. Tissues long dead in a wound are easily recognizable by their appearance. However, their removal is not sufficient for the treatment of fresh wounds. It is absolutely essential that doctors realize that tissues deprived of their blood supply by trauma, tight ligatures, and sutures, or damaged by germicides must die, even though at the time of operation no apparent changes can be detected in their appearance. *It is our belief that no surgeon has a right to operate unless he has seen or can visualize the appearance of wounds healing by primary intention from five days to a week after they are made.* If you make two similar so-called aseptic wounds upon an animal and in one cause a great deal of traumatism, use many ligatures, and tie the sutures tightly, or swab it with a germicide, both of the wounds may heal without apparent infection. However, if those two wounds are again inspected after from five days to a week, there will be a vast difference in appearance. The one with excessive traumatization, strangulating ligatures and sutures, or antisepsis will show much white necrotic tissue, in effect, foreign bodies, while the other may show a uniformly healthy granulating surface. There is no question about which one will show the greatest incidence

5 Fresh wounds, surgical or traumatic, are rarely, if ever, absolutely free from bacteria, their sterilization is relative

6 Healthy living cells have a remarkable power to combat bacteria

7 The healing of fresh wounds is brought about by the growth and activity of living cells save for what is accomplished by contraction

8 The food for this function of the living cells must, in the final analysis, come from the blood stream and be deposited in the wounds where the cells can utilize it

9 Granulation tissue is essential to the healing of all wounds

10 The stimulus to the growth of living cells which heal a fresh wound is probably released by cell damage or promoted by chemical changes which occur at the site of the wound. Some of the substances are believed to be known. The idea of determining them more accurately, and of supplying them locally or through the blood stream is intriguing

11 Dressings and temperature may be a large factor in the healing of fresh wounds

12 Rest or fixation of a fresh wound lessens trauma which causes necrosis and hemorrhage and opens up avenues for the dissemination of bacteria and their toxins

THE APPLICATION OF THESE PRINCIPLES OF WOUND HEALING TO THE TREATMENT OF FRESH WOUNDS

ASEPSIS

It must be assumed that every effort consonant with the surgeon's knowledge will be made to prevent the entrance of bacteria into fresh wounds. Thus, of course, is asepsis, and, so far as it affects the pre-operative preparation of the skin, will shortly be discussed in this journal. In other aseptic precautions it is essential to watch constantly for inconsistencies which tend always to develop in any operating room.

In spite of scientific studies which were made by Davis and many others, one still encounters throughout this country inadequate masking of the nose and mouth. Even if this be well done it is not uncommon to see auxiliary nurses and spectators in the operating room without masks.

A few years ago a nurse without a mask came into the operating room to deliver a message and was requested to stop "spitting" into the wound or onto the instruments. Since then that incident has never been repeated. A great inconsistency is often encountered in the failure to mask the patient, especially when operations are done under local anesthetic. We have seen thyroid patients talking during the preparation of the neck when everybody else in the room was perfectly masked. And the spectacle of an unmasked anesthetist peering over the screen into the wound when all others in the room are properly masked is really ludicrous even though its consequences may be tragic.

In this paper aseptic precautions cannot be fully discussed and need not be inasmuch as by and large they are well done and rarely obviate the utilization of our other knowledge with respect to wound healing.

THE CONTROL OF HEMORRHAGE

It is unnecessary to stress the fact that hemorrhage should be controlled both from the standpoint of the life of the patient as well as of the ability to repair the insult of the wound. Yet it is well to remember that all efforts to control hemorrhage should be counterchecked by a genuine desire to minimize the amount of necrosis in a wound. It was the failure to control hemorrhage which caused the use of the actual cautery to exceed its useful bounds in the days of old. And at the present time it is the failure of this same check which has permitted the use of antiseptics to cause harm to fresh wounds by exceeding their limits of rational usage.

It is quite reasonable to state that the loss of a few drops of blood is less harmful than the tying of a small vessel which will soon stop bleeding of its own accord or under the influence of gentle gauze pressure for a few moments. Ligatures cannot be tied without causing some tissue damage. Yet the surgeon who ligates the individual vessels and excises the projecting ends and who uses gentle transfixion ligatures in each endeavor to avoid mass ligatures will cause the least amount of tissue necrosis.

A word of warning is perhaps in order in connection with the use of the coagulator to stop bleeding. The tendency is to use it freely when a little pressure or waiting for a few moments would often make its use unnecessary. We have seen many wounds so charred by the coagulator and the cautery knife that if they were traumatic wounds, a careful effort to excise the dead tissue would be made. It is well to remember that the damage to tissues from burning extends well beyond the visible necrosis at the time of burning.

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of clinical infection and suppuration. Or to use another illustration, one can repeat the classic experiments of Halsted and others of producing peritonitis in dogs. The healthy peritoneum can withstand and overcome enormous charges of saline suspensions of bacteria, while if a piece of potato, devitalized muscle, or strangulated omentum be added to the cavity, relatively small doses of bacteria will result in peritonitis.

TISSUE GROWTH

The activity of living cells in the process of healing a fresh wound is really twofold. One feature is the reproduction of fixed tissue cells which must repair the defect; the other is the activity of wandering cells which must clear the road of all hindrances before healing can be complete. The principal handicaps are non-viable materials and bacteria. The obvious duty of the surgeon is to proceed in such a manner that the work of a wound will be the propagation of fixed tissue living cells. In other words, the treatment of a wound should be an endeavor to create the ideal conditions for the growth of living fixed tissue cells. Thus in a sense a wound may be regarded as a new growth which the surgeon should endeavor to aid in every way possible, knowing that the process will cease when healing is complete. The effort to adopt laboratory knowledge gained from growing tissue *in vitro* is really helpful in the healing of wounds.

BLOOD SUPPLY

Inasmuch as the activity and in the final analysis, the growth of living cells in a wound are dependent upon the blood which supplies their food, it is essential to neglect no means which will improve the blood supply. The planning of incisions so that all parts of the wound will receive the maximum supply of blood is important. The position of a wound during the process of healing and the period of fixation may make a great difference in the amount and effectiveness of the blood delivered to the wound. When there is great edema of a wound or wounded part not only is the blood supply disturbed, but the coagulum or food for the cells may actually be washed away or markedly impaired by the excessive oozing of serous fluids.

Besides securing for a wound the most ideal blood supply, it is essential to consider the quality of the blood supplied. This may lead to the introduction of fluids until the fluid balance within the tissues appears normal; the addition of blood when there is anemia or septicemia; the intravenous administration of nourishment when

there is starvation, or as recently stressed the giving of certain salts and biological substances when there is a proven deficiency of them.

GRANULATION TISSUE

A knowledge of bacteria and an interest in aseptic and antiseptic procedures have not eliminated from the process of wound healing the rôle of the granulation tissue. The part of the granulation tissue in the process remains just as important today as it did centuries ago. It is an inevitable concomitant of wound healing.

Besides, in the absence of the normal coverings and linings of the body granulation tissue is the body's best defense against the invasion of bacteria and toxic substances. Thus in the treatment of fresh wounds it becomes the doctor's duty to aid not to jeopardize the functions of granulation tissue. With these ideas in mind he will think twice before he cauterizes or cuts it away, before he makes it bleed or before he permits muscular action to damage it.

STIMULUS TO THE GROWTH OF CELLS IN A FRESH WOUND

The origin of the stimulus for the growth of living cells in a fresh wound has not been definitely determined. There is considerable evidence that it is released by cell damage or cell disintegration. *In vitro* extracts or embryonic tissue of liver and certain other organs will hasten cell growth. It seems reasonable that in a short time the introduction into fresh wounds or into the blood stream of such substances capable of stimulating cell growth will be employed. Already Lanman and others have demonstrated the value to wound healing of Vitamin C in the cases of scorbutic individuals. The stimulating effect of the sulphhydryl compounds upon cell growth has been tried out on wounds. There is probably an optimum pH for the growth of cells in a wound. When this is established efforts will undoubtedly be made to bring it about either by local or systemic medication. There are other chemical and biological substances which investigators are interested in the growth of tissues *in vitro* have found useful. That many of them will soon find practical application in the treatment of fresh wounds seems inevitable.

DRESSINGS

Many plastic surgeons realize that the success of their work depends in large measure, upon the dressings which are applied to the wounds. If they are too tight anemia, necrosis may result; if too loose edema and hematomas may cause poor

results. In many instances we would prefer to let the assistant do the operating rather than to apply the dressing

REST

Fostered by Baron Larry and amply confirmed by Billroth and others is the value of rest to the processes of a healing wound. Motion in a fresh wound brought about by joint or muscular action disturbs the medium in which the cells are growing and invites infection by causing minute hemorrhages and the death of delicate growing cells. Besides, avenues for the spread of the infection may be opened in the granulation tissue. The simple conclusion is that fresh wounds not subjected to the traumatization of activity are much more able to withstand the insults of bacterial contamination. Immobilization of fresh wounds lessens the reaction of wound healing and materially reduces the incidence of clinical infection.

With this general discussion of the treatment of fresh wounds it may be helpful to recite a few cases and then comment upon the procedures employed

CASE REPORTS

CASE No. 1 (HOLMES HOSPITAL No. 380093) The patient, forty-two years old, had exophthalmic goiter and the operation was performed under local anesthesia. After preliminary medication, the patient was brought into the operating room masked as effectively as the operator and his assistants. The neck was carefully washed with white soap and water, alcohol and ether, and then painted with merthiolate. Because of careful pressure tourniqueting, it was not necessary to clamp any vessels during the incision or turning-back of the flaps. Throughout the remaining operation all major vessels were identified and clamped before division, then immediately transfixed and gently ligated. Ends protruding beyond the ligatures were excised. After resection of the gland the patient was asked to cough very forcibly in order to test the hemostasis, any open vessels which bled were carefully ligated. Next, the wound was washed with 1 liter of salt solution poured into it from a height of 18 in. The operator, his assistants, and nurse washed their hands in salt solution and then closed the wound with unused instruments, without any drainage. The last procedure was the careful removal of all air from the wound.

Comment. The patient was masked to lessen the contamination of the wound from his breathing, talking, and coughing. One reason for the local anesthesia was that it required gentle technique if the operation was to be done painlessly, another was that the postoperative reaction and the effect of straining upon the wound from nausea and vomiting were likely to be less. Tissues distal to the ligatures were removed because we knew they would die and become foreign bodies in the wound.

The wound was carefully irrigated before closure because we regarded it as contaminated and believed that most of the bacteria could be washed from the surface. Besides, detached bits of tissue and liquefied fat were also removed by this irrigation. It is surprising the amount of debris and numbers of bacteria which can be removed from such a simple wound if the washings are carefully collected and studied.

A drain was not used because we did not want to introduce a foreign body and thus increase the chances of infection.

The air was removed because it is replaced by serum or blood which separates tissues, complicates wound healing, and enhances the chances of infection.

CASE No. 2 (HOLMES HOSPITAL No. 38001) The patient was a fifty-two-year-old woman, moderately stout, with a nine-hour-old, free perforation of a duodenal ulcer. From the history the stomach was free of food at the time of the perforation. The anesthetic was cyclopropane, the skin preparation the same as in the case of goiter. After the incision through the fat and anterior sheath of the rectus muscle, the wound was packed with moist salt sponges and pressed for a few moments. After that it was necessary to tie only a few bleeding vessels. The perforation was easily closed with four Lembert sutures which pulled the stomach over to the duodenum. The free gastric juice and fluids in the abdomen were gently aspirated.

After closure of the peritoneum the remaining wound was treated as a freshly incised traumatic wound. It was carefully irrigated with more than a gallon of normal salt solution. The skin was repainted with merthiolate and redraped. The operator, assistants, and nurse changed gowns and gloves. Sterile instruments and sutures were used for closing the wound. No sutures were placed in either the muscle or fat. The interrupted sutures in the fascia of the muscle were tied very loosely. A moist dressing, kept moist by a rubber protective, was applied.

Following the operation a Wangenstein continuous suction of the stomach was used for two days. Fluids and food were administered by the parenteral administration of salt solution, glucose solution, and blood.

On the fifth day the wound was dressed and the skin sutures were removed. Healing was by primary union with almost no reaction.

Comment. The chances of infection in this case were great. The peritoneum without contamination from food or other solid particles of debris could be expected to handle the insult. The wound was largely freed of contamination by cleansing of its surface and careful aseptic technique. Ligature and suture necrosis was reduced to a minimum. The inevitable necrosis of sutures in the fat and muscle were entirely eliminated. Trauma to the abdominal wound from vomiting was prevented by the Wangenstein apparatus, which also relieved tension and put the gastric wound at relative rest. The blood was kept in the best possible condition to supply food to the growing cells by the parenteral administration of

fluids and nourishment. The first dressing was done on the sixth day when the skin sutures of fine black silk were removed. The healing was by primary union and with no perceptible inflammatory reaction.

CASE NO 3 (HOLMES HOSPITAL NO 371033) This patient was a woman of fifty seven years with emphysema of the gall bladder, gallstones and a pericholecystic abscess. The gall bladder was removed, the cystic duct and artery were ligated with silk ligatures and six small cigarette drains were placed down to the region of the cystic duct. After closure of the peritoneum the abdominal incision was treated as though it were a freshly incised and contaminated traumatic wound. It was thoroughly washed with salt solution poured from a height of about 18 in. During the process the wound was very gently rubbed with the gloved fingers. The skin about the wound was re-sterilized as before the operation was begun. The operators and nurse changed gowns and gloves. Sterile draping was done and clean sterile instruments were used for closing the wound. Sutures were placed only in the anterior sheath of the rectus muscle; these were supported by two stay sutures of silk on each side which also served to approximate the fat. A moist saline dressing was applied and not changed for five days when the skin sutures and a few drains were removed. Healing of the wound was by primary union without any evidence of clinical infection.

Comment: During the first five days the dressings were saturated with blood tinged drainage fluid and began to smell badly. The temperature, however, was tending downward to normal and the pain was not unusual. The desire to secure for the wound the maximum rest made us choose not to disturb the wound by changing the dressing. It could not be reapplied with the same tension, which because of the respiratory movements would have meant extra trauma to the wound. In other words, we regarded the danger of traumatization from changing the dressings more serious than the possible danger of infection from the drainage soaked dressings.

Rest is so essential to the healing of fresh wounds during the first week or ten days (or until the protection of granulation tissue has formed) that it is difficult for us to justify the changing of dressings until there are indications that something more than that should be done to the wound. Pain, fever and the patient's general appearance are perhaps the best guides as to whether infection may have reached the point where something more than simple changing of the dressing may have to be done. In that event clinical judgment must dictate when rest shall be sacrificed and new avenues for the spread of infection opened up by changing the dressings in order to see if some other principle of wound treatment is definitely more indicated. Further pursuit of this line of thought would naturally lead into a discussion of the treatment

of infected wounds which is not under consideration in this paper.

CASE NO 4 (CINCINNATI GENERAL HOSPITAL NO 30740) A white male aged fifteen years was brought to the hospital April 12, 1937. He had jumped from a six foot wall and landed on a rock which had turned his left ankle to produce a compound dislocation of the tibia and fibula.

There was a transverse laceration at the level of the internal malleolus through which the lower end of the tibia protruded. The exposed parts were extremely dirty where the joint surface had struck the ground. The astragalus had become dislocated laterally to the heels and had carried with it a tip of the lateral malleolus although the fibula had not been torn from the tibia. The skin edges which were tightly stretched about the end of the tibia served to protect the astragalus and deep aspects of the wound.

The leg was washed with soap and water shaved scrubbed with alcohol and ether painted with an antiseptic and draped. A thorough debridement was done under general anesthesia and a tourniquet. The soft tissues were trimmed away at the edges of the wound. The dirty periosteum and bone and cartilage on the articular surface were shaved off with a chisel. Areolar tissue from tendon sheaths, nerves and vessels was carefully dissected off. After all gross dirt had been removed the wound was washed with large quantities of warm saline. The parts were rubbed gently with a gloved finger to remove bits of clot and tissue. When the cleansing was satisfactory the tourniquet was removed and active bleeding points were ligated with fine silk.

The dislocation was reduced and the wound closed with silk. A padded dressing was applied and the ankle placed in inversion to release tension on the suture line.

The only immediate postoperative complication was a serum rash which produced a fever of 103 on the 12th day. After the ninth day the temperature was normal.

The foot lost some of its inversion in the padded cast and produced excessive tension on the suture line so that a dry necrosis occurred at one point along the edge of the distal skin flap. The wound was not disturbed for two months for fear of breaking this protecting crust. Then the manipulation of applying a fresh cast was followed by a crack in the crust, slight local cellulitis, regional lymphadenitis and general malaise. A wet dressing was placed on the crust which came away to reveal a nicely granulating wound beneath. The fever subsided and the wound healed promptly.

At present the ankle is well stabilized, the foot gives no pain as used without any support and causes no easily detectable limp.

Comment: The debridement of dirty bone and cartilage by sharp dissection was as important as it is in soiled and devitalized soft tissues. The good result in this case depended on more than an adequate debridement. In fact a disastrous result seemed imminent when the gangrenous skin tip was discovered and was threatening to break open. The break was averted by aseptic handling of the wound until the damaged skin became dry and formed a sterile crust, by sufficient immobilization to prevent cracking of the crust and agitation of the healing surfaces within the joint by slight elevation of the part to lessen the edema, by avoidance of frequent dressings

and any manipulation until it seemed evident that good granulation tissue should be present below the crust and protecting the rest of the wound

The severe and frightening reaction which did accompany the delayed manipulation clearly demonstrates the advantage of rest and the damage which results from movements which break open avenues of absorption

CASE NO 5 (DEACONESS HOSPITAL NO 2456) A young girl of fourteen years received in an automobile accident an extensive laceration and contusion of the left thigh. A large triangular flap of skin and muscle was turned upward from just above the knee. The wound extended from the mesial side of the thigh across the top to the lateral aspect where it met a vertical laceration which extended upward for more than 6 in. The muscles were torn and loosened up as far as the greater trochanter and exposed the bone, from which a considerable area of periosteum had been removed. The tissues were badly stained and there were many stones of varying sizes throughout the extent of the wound. After a painstaking irrigation, débridement, washing with soap and water and again with salt solution, requiring more than an hour, the triangular flap of skin and subcutaneous tissue was gently laid back and sutured with three sutures which failed by $1\frac{1}{2}$ in to approximate the skin edges. No buried sutures were placed in the wound. A moist dressing was applied and the leg was encased in a large plaster spica which included the abdomen and foot. Although this patient was unconscious from a concussion of the brain and incontinent for three days during which the dressings became soaked with urine, another dressing was not made for ten days. Healing was by first intention except for the gaping, where there was healthy granulation tissue.

Comment. In many instances in which no attempt at closure is made, the wound, after the preparation described, is filled with vaseline, dressed, and immobilized for many days without even inspection unless pain or fever may indicate an infection for which the tissues may need some help other than the rest. During this time the wound's best protection, granulation tissue, forms. After that other measures to hasten healing or epithelization may be indicated.

CASE NO. 6 Not long ago a friend of mine brought his son hurriedly to my home because of a laceration of the

end of his thumb. If the boy had not held his wound under running water the father would not have been so worried, he would have put some iodine on it and wrapped it up. As it was, he was very afraid of an infection from the water. You can imagine his surprise when, after cleansing the skin about the wound with benzine and then cutting away some dead fragments of skin, I gave the boy a stool by the sink and told him to run warm water on the wound. After the lapse of ten or fifteen minutes a large amount of vaseline was placed on the wound and secured in place by a soft dressing incorporating a splint to immobilize the thumb. The hand was placed in a sling and the father was instructed not to bring him for an inspection of the wound for a week unless he should show an elevation of temperature or complain of pain. No antiseptics were used in the open wound. There was practically no pain and no fever. At the end of a week the wound was healed. The father, like thousands of other people of our generation, had been imbued since birth with the necessity of using iodine or some antiseptic to kill the germs in such a wound. He had never seen a wound like that heal without getting red and painful. He didn't know why I had used a splint, why the hand was put in a sling, or why the fragments of dead tissue were cut away. To him the one essential on such an occasion had always been to kill the germs at whatever cost in pain, suffering, and infection. He could only shake his head and say, "I do not understand."

Comment. This father's attitude reflects, we believe, the viewpoint of the average layman today with regard to the handling of trivial wounds and probably that of the vast majority of the doctors of our time with respect to all wounds.

This case has been cited because there are many conditions and circumstances under which the ideal therapy of fresh wounds is impractical. Under such circumstances the only course of procedure is a logical compromise with one's ideals. First, however, those ideals must be founded upon a thorough knowledge of the principles of wound healing and of the indications for their use.

SUMMARY

In this paper we have endeavored to list the most important principles of wound healing and to indicate by discussion and case reports how these various principles may be logically employed in the treatment of fresh wounds.

fluids and nourishment. The first dressing was done on the sixth day when the skin sutures of fine black silk were removed. The healing was by primary union and with no perceptible inflammatory reaction.

CASE NO. 3 (HOLMES HOSPITAL NO. 371033) This patient was a woman of fifty-seven years with emphysema of the gall bladder, gall stones and a pericholecystic abscess. The gall bladder was removed, the cystic duct and artery were ligated with silk ligatures and six small cigarette drains were placed down to the region of the cystic duct. After closure of the peritoneum the abdominal incision was treated as though it were a freshly incised and contaminated traumatic wound. It was thoroughly washed with salt solution poured from a height of about 18 in. During the process the wound was very gently rubbed with the gloved finger. The skin about the wound was sterilized as before the operation was begun. The operators and nurse changed gowns and gloves. Sterile draping was done and clean sterile instruments were used for closing the wound. Sutures were placed only in the anterior sheath of the rectus muscle; these were supported by two stay sutures of silk worm gut, which also served to approximate the fat. A moist saline dressing was applied and not changed for five days when the skin sutures and a few drains were removed. Healing of the wound was by primary union without any evidence of clinical infection.

Comment. During the first five days the dressings were saturated with blood-tinged drainage fluid and began to smell badly. The temperature, however, was tending downward to normal and the pain was not unusual. The desire to secure for the wound the maximum rest made us choose not to disturb the wound by changing the dressing. It could not be reapplied with the same tension, which, because of the respiratory movements, would have meant extra trauma to the wound. In other words we regarded the danger of traumatization from changing the dressings more serious than the possible danger of infection from the drainage soaked dressings.

Rest is so essential to the healing of fresh wounds during the first week or ten days (or, until the protection of granulation tissue has formed) that it is difficult for us to justify the changing of dressings until there are indications that something more than that should be done to the wound. Pain, fever and the patient's general appearance are perhaps the best guides as to whether infection may have reached the point where something more than simple changing of the dressing may have to be done. In that event clinical judgment must dictate when rest shall be sacrificed and new avenues for the spread of infection opened up by changing the dressings in order to see if some other principle of wound treatment is definitely more indicated. Further pursuit of this line of thought would naturally lead into a discussion of the treatment

of infected wounds which is not under consideration in this paper.

CASE NO. 4 (CINCINNATI GENERAL HOSPITAL NO. 80740) A white male aged fifteen years was brought to the hospital April 13, 1937. He had jumped from a six foot wall and landed on a rock which had turned his left ankle to produce a compound dislocation of the tibia and fibula.

There was a transverse laceration at the level of the internal malleolus through which the lower end of the tibia protruded. The exposed parts were extremely dirty where the joint surface had struck the ground. The astragalus had become dislocated laterally to the fibula and had carried with it a tip of the lateral malleolus although the fibula had not been torn from the tibia. The skin edges which were tightly stretched about the end of the tibia served to protect the astragalus and deep aspects of the wound.

The leg was washed with soap and water, shaved, scrubbed with alcohol and ether, painted with an antiseptic and draped. A thorough debridement was done under general anesthesia and a tourniquet. The soft tissues were trimmed away at the edges of the wound. The dirty periosteum and bone and cartilage on the articular surface were shaved off with a chisel. Areolar tissue from tendon sheaths, nerves, and vessels was carefully dissected off. After all gross dirt had been removed the wound was washed with large quantities of warm saline. The parts were rubbed gently with a gloved finger to remove bits of clot and tissue. When the cleansing was satisfactory the tourniquet was removed and active bleeding points were ligated with fine silk.

The dislocation was reduced and the wound closed with silk. A padded dressing was applied and the ankle placed in inversion to release tension on the suture line.

The only immediate postoperative complication was a serum rash which produced a fever of 103 on the sixth day. After the ninth day the temperature was normal.

The foot lost some of its inversion in the padded cast and produced excessive tension on the suture line so that a dry necrosis occurred at one point along the edge of the distal skin flap. The wound was not disturbed for two months for fear of breaking this protecting crust. Then the manipulation of applying a fresh cast was followed by a crack in the crust, slight local cellulitis, regional lymphadenitis and general malaise. A wet dressing was placed on the crust which came away to reveal a nicely granulating wound beneath. The fever subsided and the wound healed promptly.

At present the ankle is well stabilized, the foot gives no pain, is used without any support and causes no easily detectable limp.

Comment. The debridement of dirty bone and cartilage by sharp dissection was as important as it is in soiled and devitalized soft tissues. The good result in this case depended on more than an adequate debridement. In fact, a disastrous result seemed imminent when the gangrenous skin tip was discovered and was threatening to break open. The break was avoided by aseptic handling of the wound until the damaged skin became dry and formed a sterile crust, by sufficient immobilization to prevent cracking of the crust and agitation of the healing surfaces within the joint by slight elevation of the part to lessen the edema by avoidance of frequent dressings.

The fifth measurement is the vertical distance from the margin of the lid to the top of the superior tarsal arch, normally 8 mm in the adult

The behavior of the ptosis in the upward and downward gaze should also be noted. These observations are a guide to the selection of the operation and the amount of correction to be undertaken

Some of the operative procedures are discussed briefly. Clean-cut oval excisions are valuable when redundant integument exists, or to supplement other procedures. They heal inconspicuously with subcutaneous sutures. The flap-tucking, transplanting cutaneous operations are often attended by ugly puckering, with the possible exception of the Hess operation

In cases of moderate ptosis without excessive weight, operations for tarsal resection, such as that of Gillet de Grandmont, are excellent if there is still some action of the levator muscle. Suture operations relying on the irritation produced by the transit channel to contract and hold the drooping tissues are usually disappointing

Among the operations best calculated to correct the heavy lid is the Fergus operation, which is the direct transplantation of a tongue of the occipitofrontalis muscle into a pocket between the tarsus and the orbicularis muscle. A better procedure is the operation of Eversbusch, in which the tarso-orbital fascia and adjacent tissues, including the levator muscle, are folded into a pocket on the surface of the tarsus. Another one is the Hess operation in which the skin is tucked from the under surface, and the tarso-orbital fascia is approximated to the occipitofrontalis muscle

Motais was the first to practice the operation which gave mobility to the lid by means of the superior rectus muscle. A tongue of the muscle 3 mm wide and 10 mm long was dissected out and passed through an incision through the tarso-orbital fascia and the levator muscle, drawn into a pocket between the orbicularis muscle and the tarsal surface, and, finally, anchored 2 mm below the curve of the tarsus

Parinaud modified the procedure to allow gradation of the operation, having for its object the direct attachment of the unmutated muscle to the arch of the tarsus, with no dissection of the tongue. Jameson thinks that operations based on the Parinaud conception are much stronger than the Motais operation and that the Parinaud procedure insures a larger return of correction

Jameson reports a procedure which he has used in 8 cases with good results. It embodies the following principles: (1) the use of the entire strength of the unmutated superior rectus muscle, (2) a direct incision into the cartilage with entrance into a pocket prepared for the reception of the folded muscle, instead of the incision into the levator muscle or the tarso-orbital fascia and then into the post-orbital region, (3) shortening of the muscle and consequent elevation of the lid by the folding of the attached muscle on itself prior to its introduction into the

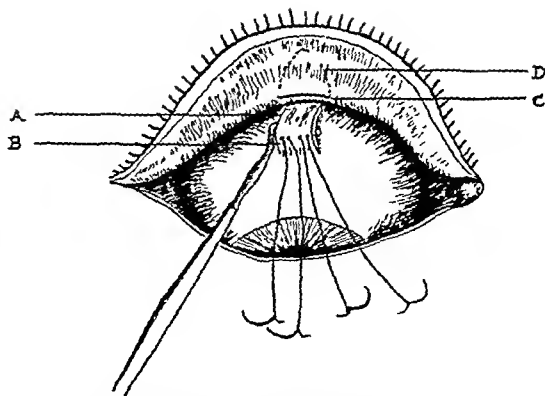


Fig 1 After the lid is everted the superior rectus muscle is dissected out but not detached (A). Two double-armed sutures are introduced from under the surface, the farther back on the muscle these are introduced, the greater the shortening (B). An incision is made directly into the cartilage about 2 mm below the upper surface of the tarsus (C). A pocket is made between the orbicularis muscle and the tarsal surface (D).

pocket with the addition of elevating the tarsus by placing the incision in the cartilage farther below the curve, and (4) the secure attachment of a folded shortened muscle

The approach is entirely from the conjunctival side. The superior rectus muscle is dissected free, but not detached. Two double-armed sutures are introduced, gradation of the shortening being possible by variance in the location of these sutures. An incision is made directly into the cartilage, large enough to admit the muscle into a pocket prepared for it. The muscle is overlapped on itself by drawing the sutures and muscle into the pocket, securing it there by passing the sutures through to the margin of the lid, and tying them on bolsters.

Further gradation can be obtained by making the incision farther down in the tarsus, and by approximating the muscle nearer to the intermarginal space by traction.

EDWARD S. PLATT, M.D.

Arruga, H.: The Treatment of Detachment of the Retina. *Arch. Ophthalmol.*, 1937, 18, 501.

Arruga believes that more ophthalmologists should undertake the operative treatment of retinal detachment, since, from a humanitarian standpoint, it is better to achieve cures in 50 per cent of all cases than in 70 per cent of the cases in the hands of a very few experienced surgeons. He believes that emphasis should be placed upon careful ophthalmoscopic examination and that careful and accurate localization of the retinal tear will improve the prognosis in from 20 to 25 per cent of the cases, for it is then not necessary to do such an extensive operative procedure with consequent damage to the ocular function. A schematic drawing of the fundus findings should be made. Frequent ophthalmoscopic examinations during the course of operation will help to control

SURGERY OF THE HEAD AND NECK

HEAD

Ersner M S and Myers D Treatment of Thrombosis of the Lateral Sinus Without Ligation of the Internal Jugular Vein *J Am W Ass* 1937 100 919

The authors believe that treatment of infection of the lateral sinus is primarily medical and only partially surgical. Among the medical measures transfusion of whole blood is important. Small amounts 15 to 20 cc per pound (0.5 kgm) of body weight are given daily or on alternate days. Specific serum should be used when it is available. Sulfanilamide has been reported during the past year to be strikingly beneficial.

The surgical principles advocated are the institution of drainage and the avoidance of overmanipulation. Thrombectomy is not indicated when the thrombus is firmly fixed. These principles are based on the belief that thrombosis is a protective process and on the conclusion that ligation of the internal jugular vein is not a panacea in the treatment of infection of the lateral sinus.

WALTER H NADLER MD

Rosedale R S, and Koepf S W Non Tumorous Cysts of the Maxilla Interesting Cases and Discussion *Ann Otol Rhinol & Laryngol* 1937 46 632

The authors discuss the etiology of maxillary cysts and the origin of the cystic fluid which they believe is a transudate rather than a secretory product of the epithelial lining. The cysts under consideration are all originally situated in bone and as they enlarge they cause bone atrophy which is characterized by halitosis and osteoporosis. The bone is distended until finally the cyst may be limited by only a thin cortical shell. Very large cysts may perforate the outer cortical plates in the canine fossa and be limited only by soft tissue. They may cause the floor of the orbit to be raised, the malar eminence to be hollowed, the palate to be extended downward, the outer plate of the labial alveolar process to bulge forward with protrusion of the lip, or the opposite maxilla to be encroached upon when the cyst is located in the anterior part of the upper jaw. Encroachment upon the maxillary sinus is common and often associated with medial displacement of the lateral nasal wall.

The diagnosis is not difficult. Slowly growing tumor masses such as odontomas, cystic adamantinomas or deep malignancies such as carcinoma of the antrum must be considered in the differential diagnosis. Palpation and aspiration give valuable information. The former may give a sensation of crepitus, the latter will yield a clear fluid containing cholesterol crystals. X rays will aid generally and should be used routinely as well as biopsy examination

particularly to exclude adamantinoma even though the diagnosis is apparent.

The treatment should consist of removal of the cyst by blunt dissection through intra-oral incision over the point of swelling. The remaining cavity is then connected to the nose through a large sized window under the inferior turbinate, after which procedure the first incision is closed by sutures. This type of treatment tends to result in less deformity and discomfort and in more rapid healing than treatment by packing and irrigation through the intra-oral incision.

Seven cases of non tumorous cysts of the maxilla illustrated by roentgenograms are discussed. Of these 6 presented perforations of the outer cortical plate of the maxilla resultant facial deformity and encroachment of the cyst upon the antrum. In 3 the cysts were more advanced with bilateral antral involvement, 2 of the cysts were follicular cysts, 1 without teeth, the other one was associated with an antral odontoma.

KURT H THOMA DMD

EYE

Jameson P C The Surgical Management of Ptoxis with Special Reference to Use of the Superior Rectus Muscle *Arch Ophth* 1937 18 547

Many different procedures have been described for the surgical treatment of ptoxis which indicates that no one operation is suitable for all types of cases. A survey of the conditions present should permit differentiation between the various types of ptoxis—the congenital or partial paralytic and the non paralytic the obstructive integumentary trachomatous and symblepharon types and the types which impart bulk to the lid.

Jameson describes measurements and relations which have not been described in relation to ptoxis, the first of which is the relation of the margin of the upper lid to the globe. The margin is always found on a line midway between the pupillary margin and the upper limbus, a relationship scrupulously maintained in the primary position in a normal person. The drop below this line in millimeters is the amount of the ptoxis.

The second and third measurements are the vertical and horizontal measurements of the palpebral opening normally 9 mm and 27 mm respectively. A reduced horizontal measurement may indicate the necessity for a canthotomy.

The fourth measurement is the distance between the margin of the lid and the arch of the eyebrow with the eyes in the primary position. In the normal young subject this measurement varies from 15 to 18 mm whereas in congenital ptoxis it may be from 25 to 30 mm.

Meleney, F. L.: *The Use of Zinc Peroxide in Oral Surgery*. *Internal J Orthodontia & Oral Surg*, 1937, 23 932.

The alimentary tract of man normally contains many organisms. These are constantly being introduced with food and other objects that are put into the mouth. The predominating aerobic organism in the mouth is the green streptococcus. We do not ordinarily think of these bacteria as being present, or as being of much importance in the mouth, but under certain circumstances such organisms play an important rôle in infections which result from a contamination of the tissues with mouth organisms.

Infection may occur when the first line of defense has broken down, namely, when there has been a break in the continuity of the surface epithelium as the result of a wound caused by some sharp object, or as the result of chemical erosion of the surface epithelium, or by direct invasion of the mucous membrane by certain pathogenic organisms. When a tooth is extracted, there is invariably an injury to the surface mucous membrane and a break in the surface of the tooth socket, and contamination of these surfaces with the mouth organisms occurs immediately. Of great importance, then, are (1) the restriction of injury to the tissues, and (2) the restriction of the number of contaminating organisms.

Infection may spread by three routes (1) by means of the lymph channels, (2) by means of the blood vessels, and (3) by means of direct extension. The lymphatics of the oral cavity drain into the collar of lymph glands below the jaw. The blood vessels of the oral cavity also serve as a route by which infection may spread, chiefly along the venous branches which follow well known anatomical distributions. Of particular importance are communications between these vessels, in which there are no valves, and the ophthalmic veins, because if there is any blockage to the downward flow of blood it may flow back through the pterygoid plexus into the inferior ophthalmic vein, through the angular vein at the inner angle of the eye into the superior ophthalmic vein, and thus into the cavernous sinus.

The fascial spaces of the face and neck also direct or limit the spread of infection.

Anaerobic and micro-aerophilic organisms play a prominent part in inflammatory processes in the gums, as in pyorrhea, or in ulcerated infections of the tongue and cheek which are commonly called stomatitis.

The hemolytic streptococcus commonly produces a diffuse cellulitis of the tissues of the throat and, not infrequently, spreads to the neck, and closure of the glottis is frequently threatened or produced by the rapid development of edema, but there is usually no necrosis of the mucous membrane or of the deep tissues of the neck. Usually, the hemolytic streptococcus infections produce a high fever and a profound intoxication, while infections due to the anaerobic and micro-aerophilic organisms produce less fever and less intoxication, but a more distressing and extensive destruction of tissue. The hemo-

lytic streptococcus infections are likely to arise acutely and to subside rapidly, while the micro-aerophilic and anaerobic infections are more apt to develop slowly, spread insidiously, and resolve less rapidly.

When aerobic organisms are present in the mouth unaccompanied by any inflammation they may be restricted or eliminated by a number of oxidizing agents, such as potassium chlorate, potassium permanganate, or sodium perborate, but they are more quickly and more effectively eliminated by the use of zinc peroxide. When, however, there is an infection, either mild or grave, with an invasion of the submucous tissues and superficial ulceration of the mucous membrane, zinc peroxide is much more effective in treatment than are other oxidizing substances. When the infection has spread to the deeper layers, radical surgery is required. After the tissues have been opened up by adequate surgery, however, the infection can be brought under control by the careful application of zinc peroxide suspended in sterile distilled water to every part of the infected surface.

The zinc peroxide must be an effective preparation, as shown by preliminary tests indicating its ability to liberate oxygen when suspended in distilled water. Only the "medicinal grade" should be used. It should be sterilized in small quantities for four hours, at 140° C dry heat, and applied as follows.

The dry powder is suspended in approximately an equal quantity of water so that it has the consistency of 40 per cent cream. It can be mixed nicely with an aseptic syringe and applied with the syringe to every part of the wound surface. If there are any sinuses, it should be delivered into them with a catheter, but if there are any parts of the infection which cannot be reached, the wound will have to be opened so as to permit contact, which is essential. When the whole surface of the wound has been covered, fine meshed gauze which has been soaked in zinc peroxide should be placed over the surface, and the whole wound sealed with several layers of vaseline gauze to prevent evaporation. The dressing should be changed daily. The zinc peroxide—about one part of powder to four parts of water—should also be used at the same time as a mouth wash.

LOUIS T. BYARS, M D

NECK

Lahey, F. H.: *Pulsion Esophageal Diverticulum*. *J Am M Ass*, 1937, 109 1414

A pharyngo-esophageal diverticulum is a protrusion of the mucosa and submucosa of the hypopharynx through the muscular wall of the hypopharynx. The sac lies between the pretracheal and prevertebral fascia, and its neck is surrounded by fibers of the inferior constrictor muscle and the muscle which splits off from it obliquely to extend down the esophagus, the cricopharyngeus muscle. This muscle's relationship to the neck of the sac is of the utmost

the operation and orient the surgeon after his first punctures are made. Transillumination may be helpful in localizing the tear. The light of the ophthalmoscope may be fixed on the tear while the assistant notes which part of the sclera is illuminated or the transilluminator may be used on the sclera and the assistant may observe with the ophthalmoscope the point at which the tear is illuminated.

At the present time diathermy is the method of treatment in most general use. It is preferable to the original cautery method of Gonn or the chemical cauterization method of Lindner and Guist. Both surface diathermy and perforating diathermy are used, the choice depending upon the type of detachment that is present. In cases of large bulging detachments both forms may be used jointly. It is important that subretinal fluid does not remain at the conclusion of the operation, as this will prevent the formation of adhesive chorioretinitis.

Following the operation it is important to band age both eyes and to keep the patient in bed for several days. If necessary, the operation may be repeated after twelve days.

Many factors in the pathogenesis of detachment of the retina are still not fully understood. The tear undoubtedly plays a great rôle, but there are probably several means by which a detachment may be produced. These are described in detail.

WILLIAM A. MANN, Jr. M.D.

Dunnington J. H. and Macnife J. P. Detachment of the Retina. Operative Results in 164 Cases. *Arch. Ophth.* 1937 18: 532.

The authors report the results obtained in 164 patients who were operated upon for detachment of the retina. Sixty seven per cent of the patients were males, and this greater percentage of males is partially accounted for by the higher incidence of trauma in the males. There was a definite history of trauma in 17 per cent of all cases, and an indefinite history of trauma in 13 per cent. Cure was obtained in 62 per cent of the patients giving a definite history of injury. Ages varied from six to seventy nine years. In 31 patients both eyes were involved. Some degree of myopia was present in 53.8 per cent of the patients, and a myopia amounting to at least 6 diopters was present in nearly a third of the patients.

Hypotonia was found to be a grave prognostic sign. Improvement was obtained in 68.5 per cent of cases in which one half or less of the retina was detached, whereas in cases in which three fourths or more of the retina was involved, 30.9 per cent were improved by operation. As to the results of all of the cases, the inferior portion of the retina was detached.

Cases in which no tears were found responded well to operation as those in which retinal hole were discovered prior to operation, although wide spread treatment of the affected area by diathermy was employed in all cases.

A total of 171 eyes were operated upon, with cure in 42.2 per cent, improvement in 8.2 per cent, and failure in 49.7 per cent. Advanced age, high myopia, aphakia, hypotonia, extensive detachment and large or multiple tears influenced the prognosis unfavorably.

WILLIAM A. MANN, Jr. M.D.

EAR

Sourdille M. The Present Position of the Surgical Treatment of Otosclerosis. *Proc. Roy. Soc. Med. Lond.* 1937 30: 1519.

The author states that for the time being one must operate only in cases of primary otosclerosis accompanied by ankylosis of the stapes, i.e. the tympano-labyrinthine form with negative Rinne and prolonged Schwabach reactions. Operation must not be performed in cases of secondary otosclerosis with even slight inflammation in the tympanum, as in these cases there is a great risk of consecutive necrosis of the incus and labyrinthine infection.

One must not wait too long before proposing the treatment. As a rule the hearing is definitely improved by operation and is from ten to twenty times more powerful than before.

If the operation is performed at an early stage for example when a low voice can still be heard at 1 m, restitution to normal may be expected. However, most of the patients refuse the operation at that stage and accept it only much later when their hearing is more severely impaired. If a loud voice cannot be heard beyond 0.5 m, the results will not be completely satisfactory, but with some aid the patient will be able to resume his ordinary life.

JAMES C. BRASWELL, M.D.

MOUTH

Buralassi P. The Treatment of the Lymphatic Glands in Cases of Malignant Epithelial Tumors of the Oral Cavity (il trattamento dei gangli linfatici nei portatori di tumori epiteliali maligni del cavo orale). *Tumori* 1937 33: 594.

The author presents a complete discussion of the anatomy, pathology and clinical indications for interference with the regional lymph nodes in the treatment of malignant lesions of the lips and cheek. A number of case reports are included.

Early radical surgical intervention is the treatment of choice in the attack on the local lymphatic drainage of malignant growths of the lips and cheek. A detailed discussion of the rationale of the surgical attack on the submental, submaxillary and superficial parotid lymph nodes is presented.

Radiological treatment should be reserved for those patients in whom there is a definite contra-indication to operation or for those in whom the lymph nodes are inaccessible to surgical attack. As complement to extirpation radiation remains valuable.

number of figures with detailed explanations
element the report

A. LOUIS ROSE, M.D.

Meleney, F. L.: The Use of Zinc Peroxide in Oral Surgery. *Internal J Orthodontia & Oral Surg.* 1937, 23 932

The alimentary tract of man normally contains many organisms. These are constantly being introduced with food and other objects that are put into the mouth. The predominating aerobic organism in the mouth is the green streptococcus. We do not ordinarily think of these bacteria as being present, or as being of much importance in the mouth, but under certain circumstances such organisms play an important rôle in infections which result from a contamination of the tissues with mouth organisms.

Infection may occur when the first line of defense has broken down, namely, when there has been a break in the continuity of the surface epithelium as the result of a wound caused by some sharp object, or as the result of chemical erosion of the surface epithelium, or by direct invasion of the mucous membrane by certain pathogenic organisms. When a tooth is extracted, there is invariably an injury to the surface mucous membrane and a break in the surface of the tooth socket, and contamination of these surfaces with the mouth organisms occurs immediately. Of great importance, then, are (1) the restriction of injury to the tissues, and (2) the restriction of the number of contaminating organisms.

Infection may spread by three routes: (1) by means of the lymph channels, (2) by means of the blood vessels, and (3) by means of direct extension. The lymphatics of the oral cavity drain into the collar of lymph glands below the jaw. The blood vessels of the oral cavity also serve as a route by which infection may spread, chiefly along the venous branches which follow well known anatomical distributions. Of particular importance are communications between these vessels, in which there are no valves, and the ophthalmic veins, because if there is any blockage to the downward flow of blood it may flow back through the pterygoid plexus into the inferior ophthalmic vein, through the angular vein at the inner angle of the eye into the superior ophthalmic vein, and thus into the cavernous sinus.

The fascial spaces of the face and neck also direct or limit the spread of infection.

Anaerobic and micro-aerophilic organisms play a prominent part in inflammatory processes in the gums, as in pyorrhea, or in ulcerated infections of the tongue and cheek which are commonly called stomatitis.

The hemolytic streptococcus commonly produces a diffuse cellulitis of the tissues of the throat and, not infrequently, spreads to the neck, and closure of the glottis is frequently threatened or produced by the rapid development of edema, but there is usually no necrosis of the mucous membrane or of the deep tissues of the neck. Usually, the hemolytic streptococcus infections produce a high fever and a profound intoxication, while infections due to the anaerobic and micro-aerophilic organisms produce less fever and less intoxication, but a more distressing and extensive destruction of tissue. The hemo-

lytic streptococcus infections are likely to arise acutely and to subside rapidly, while the micro-aerophilic and anaerobic infections are more apt to develop slowly, spread insidiously, and resolve less rapidly.

When aerobic organisms are present in the mouth unaccompanied by any inflammation they may be restricted or eliminated by a number of oxidizing agents, such as potassium chlorate, potassium permanganate, or sodium perborate, but they are more quickly and more effectively eliminated by the use of zinc peroxide. When, however, there is an infection, either mild or grave, with an invasion of the submucous tissues and superficial ulceration of the mucous membrane, zinc peroxide is much more effective in treatment than are other oxidizing substances. When the infection has spread to the deeper layers, radical surgery is required. After the tissues have been opened up by adequate surgery, however, the infection can be brought under control by the careful application of zinc peroxide suspended in sterile distilled water to every part of the infected surface.

The zinc peroxide must be an effective preparation, as shown by preliminary tests indicating its ability to liberate oxygen when suspended in distilled water. Only the "medicinal grade" should be used. It should be sterilized in small quantities for four hours, at 140° C dry heat, and applied as follows:

The dry powder is suspended in approximately an equal quantity of water so that it has the consistency of 40 per cent cream. It can be mixed nicely with an aseptic syringe and applied with the syringe to every part of the wound surface. If there are any sinuses, it should be delivered into them with a catheter, but if there are any parts of the infection which cannot be reached, the wound will have to be opened so as to permit contact, which is essential. When the whole surface of the wound has been covered, fine meshed gauze which has been soaked in zinc peroxide should be placed over the surface, and the whole wound sealed with several layers of vaseline gauze to prevent evaporation. The dressing should be changed daily. The zinc peroxide—about one part of powder to four parts of water—should also be used at the same time as a mouth wash.

LOUIS T BYARS, M D

NECK

Lahey, F. H.: Pulsion Esophageal Diverticulum. *J Am M Ass.*, 1937, 109 1414

A pharyngo-esophageal diverticulum is a protrusion of the mucosa and submucosa of the hypopharynx through the muscular wall of the hypopharynx. The sac lies between the pretracheal and prevertebral fascia, and its neck is surrounded by fibers of the inferior constrictor muscle and the muscle which splits off from it obliquely to extend down the esophagus, the cricopharyngeus muscle. This muscle's relationship to the neck of the sac is of the utmost

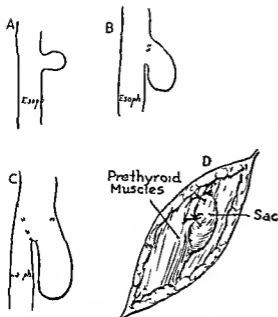


Fig 1. A B and C demonstrate how the opening into the sac changes position as the sac enlarges. In the early sac the opening is directly lateral as in A, as the sac becomes larger and descends it becomes a little more oblique as in B, and as the sac becomes still larger and descends into the mediastinum as in C the opening into the sac and the previous transverse opening into the esophagus become oblique. By the traction of the food filled sac the edges of the opening into the true esophagus are brought together so that the opening appears as a mere slit. D shows the method of suturing the sac with black silk sutures to the outer and upper edge of the sternohyoid muscle and also the plan of implanting the sac in the upward direction so that between the first and the second stage food will not pass through it.

importance since unless the constricting muscle fibers about the neck of the sac are accurately removed the sac is quite apt to recur.

In a study of 53 patients operated on more than two years previously in the Lahey clinic the symptoms in the order of frequency were difficulty in swallowing regurgitation gurgling noises in the neck (40 cases) attacks of strangling or coughing and loss of weight. Two patients had pulmonary abscesses which required drainage before the cervical operation.

The successful operative treatment involves the complete removal of the constrictor muscle fibers

from about the neck of the sac and the protection of the patient from the development of cellulitis between the prevertebral and pretracheal fascia and extension of this infection into the mediastinum. The two-stage operation has been found most effective as in the entire series no mediastinal infection was observed. It was not found necessary to pass the esophagoscope into a diverticulum in any case. Cervical block anesthesia with procaine hydrochloride was employed and the patient could assist by swallowing during the operation. Lahey's plan of operation involves implanting the sac of the diverticulum in the wound between the first and the second stage of the operation so that it points upward and food cannot enter the sac and swallowing is immediately unobstructed. Another plan involves burying small diverticular sacs in the wound by attaching the tip of the sac to the upper edge of the thyrohyoid muscles by two black silk sutures as shown in Figure 1. This makes it possible to do a two stage operation on any diverticulum no matter how small if it has a sac and by the employment of the black silk sutures to find readily the tip of the sac in the granulating wound when it is reopened at the second operation.

Postoperative dilation with a modified Plummer bag has been a factor in the improved results. In 5 of 53 patients the left recurrent laryngeal nerve was injured but paralysis was permanent in only 1. In 18 cases a fistula followed resection of the sac. These were early cases in which the esophagus was left open and covered with gauze to allow for closure by granulation. Since implanting the sac high in the neck little trouble from fistulas now results. A secondary abscess developed in the wound in 5 cases. All these abscesses ruptured or were drained and healed. Difficulty in swallowing developed between the first and second stage because of the accumulation of air in a large sac. This was overcome by suturing a catheter into the dome of the sac and guiding it into the esophagus. Two patients had a recurrence of the sac because of inadequate primary removal. One was re-operated with complete relief. The other refused re-operation. Two patients have had partial recurrence with some symptoms. Nineteen patients showed some retention of bismuth in the hypopharynx on x ray examination but 11 were free from symptoms. In 2 cases the second stage was not done. One death resulted from uremia. In the other case complete relief was obtained. Three years have now elapsed since the operation. Lahey suggests that in the very old and in patients who are bad risks the simple freeing of the sac and high implantation is sufficient.

MANUEL E. LICHTENSTEIN, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Loehr, W: The Value of Arteriography in the Neurological Diagnosis of Head Injuries (Die Bedeutung der Arteriographie fuer die neurologische Diagnostik bei Schaedelverletzungen) *Deutsch Mil arzt*, 1937, 2 49

Loehr decries unscientific criticism of arteriography and endorses, in large measure, the practical and pathologicophysiological significance of this technique which is finding more widespread use. He also discusses its value in cases of head injury based on individual observations. In cases of concussion he finds that the vascular system of the brain is topographically normal, but the vessels appear to be in a marked state of contraction, similar to that seen in the increased intracranial tension of hydrocephalus. In cerebral contusion, there appears to be a loss of vasomotor tone. The picture may look singularly worse during the so-called capillary phase, in which the individual vessels are widened and flattened, and only partly filled. The veins are also filled. Cerebral compression following meningeal hemorrhage shows a typical picture. There is a compression of the anterior cerebral artery on both the injured and the normal side, which often fills on the normal side, from an injection on one side. There is a narrowing of the normal right angle existing between the anterior and middle cerebral arteries by elevation of the peripheral branches of the middle cerebral arteries, and a compression of the finer branches of the middle cerebral artery from the vault of the skull, by the separation of the dura, occasioned by the hematoma. In the lateral view one may observe an engorgement and compression of the carotid siphon, and elevation of the first and second thirds of the Sylvian vessels. The film will also give an indication of the size of the epidural hematoma.

The injection is made into the internal carotid artery, as it is not possible to inject directly into the torn middle meningeal vessel, or to reach the hematoma by an injection into the external carotid artery. In contrast to the tumors of the temporal bone, differential diagnosis must be made from compression of the branches of the middle cerebral artery by the bony vault. The author observes that epidural hematomas develop very rapidly, much more rapidly than one would expect from the rise in the intracranial pressure. This is emphasized by three case histories. Two of the patients were operated upon too late, while the third was admitted to the hospital in a hopeless state. Epidural hematoma was given as the cause of death in all three cases. The author warns against the indiscriminate use of lumbar and sub-occipital puncture in these cases, as he has seen two deaths following these maneuvers.

Subdural hemorrhages following rupture of cerebral vessels can also be demonstrated by arteriography.

In conclusion, the author points out the difficulties in diagnosis which determine the therapy and the prognosis. He believes that arteriography may be of great help in cases of head injury, which are growing in frequency. With the advances in motorization of the armies, head injuries will be much more common in future wars.

(WANKE) WILLIAM C BECK, M D

Oliverona, H.: Blood-Vessel Tumors and Blood-Vessel Anomalies of the Brain (Ueber Gefaessgeschwuelste und Gefaessmissbildungen des Gehirns) *Orvosképzés*, 1936, 26 778

The author divides the vascular tumors of the brain into four groups, partially according to the classification of Virchow. (1) angioma cavernosum (with the subgroupings of telangiectasia and Sturge-Weber's syndrome), (2) racemose angioma (arterial, venous, arteriovenous), (3) angioreticuloma, and (4) angioglioma. The cavernous angioma is rare and is of little clinical importance.

The author, following Bergstrand's suggestion, defines the Sturge-Weber syndrome as a vascular anomaly in which there are typical calcium deposits in the brain, which can be demonstrated roentgenographically. These deposits cause epileptiform convulsions, and are associated with a nevus flammeus in the face and often a glaucoma. The calcium deposits are in the cortex of the brain. The disease should be considered a vascular anomaly, which primarily affects the smaller vessels of the brain, the pia mater, the eye, and the skin.

Of the racemose angiomas, the arterial type is very rare, or perhaps never occurs. The venous type may appear as a simple varicosity, or it may form a knot of vessels. Should such a knot of vessels be nourished by arterial blood, then the angioma may be considered as an arteriovenous type.

The angioreticuloma is a tumor and occurs almost exclusively in the cerebellum. Lindau's disease is the description of a triad of symptoms which arise from an angioma reticuloma in the cerebellum, an angioma in the retina, and cyst formation in the pancreas or kidneys.

The angiogliomas described by Oberling and Roussy are of more pathological than clinical interest.

The author's material included a total of 1,146 histologically proved brain tumors, 581 (50.7 per cent) of which were gliomas, 207 (18.06 per cent) meningiomas, 121 (10.6 per cent) neurinomas, 82 (7.2 per cent) adenomas, 21 (1.8 per cent) cranio-pharyngiomas, 10 (0.9 per cent) cholesteatomas, 4 (0.3 per cent) teratomas, 49 (4.3 per cent) angiomas, 6 (0.5 per cent) papillomas, 19 (1.7 per cent) granulomas, and 28 (2.4 per cent) metastases.

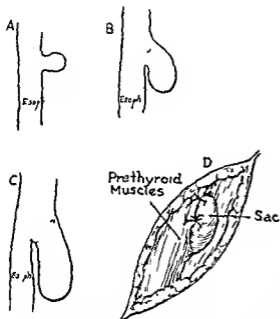


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MARCEL E. LICHTENSTEIN, M.D.

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The views presented on the genesis of quadrantanopsia in temporal-lobe tumor possibly explain some additional peculiarities. The macular bundle is not or only insignificantly affected by a compression of the anterior chorioid artery, and, therefore, central vision remains intact. The localization of the injury in the lateral geniculate body also explains the occurrence of incongruent visual-field defects and the not rare persistence of the pupillary reflex. Several authors mention pyramidal-tract symptoms in temporal-lobe tumor, such as facial paralysis and paresis in one or both contralateral extremities. As the pons receives a part of its blood supply from the anterior chorioid artery, an explanation of this symptom also seems possible. LOUIS NEUWELT, M D

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SYMPATHETIC NERVES

Grimson, K. S., Wilson, H., and Phemister, D. B.: The Early and Remote Effects of Total and Partial Paravertebral Sympathectomy on Blood Pressure. *Ann Surg*, 1937, 106: 801

As an addition to the current interest in surgical treatment of hypertension, the authors report the early and late effects of complete and partial removal of the paravertebral sympathetic chains, or of partial anterior spinal rhizotomy, on the blood pressure, blood volume, blood viscosity, cardiac output, and pulse rate of dogs. The article is adequately illustrated by charts, graphs, and tables of results.

It was found that following sympathectomy there was a fall in the blood pressure which, however, had returned to pre-operative levels by the end of six months, and that a bradycardia and a decreased cardiac output occurred concurrently with the drop in the blood pressure. The authors believe that the peripheral vascular resistance during the stage of lowered blood pressure is due to an inherent vascular tone, but that after the blood pressure has returned to normal it is due in a large measure to reestablished central vasomotor tone. Judging by the response of the sciatic nerve to stimulation, recovery of vasoconstriction is eventually incomplete. Upon electrical stimulation of the sciatic nerve, hypothalamus, and the distal cut end of the spinal cord early in the period following complete sympathectomy, the authors found that the fall in blood pressure in their animals suggested the presence of extrasympathetic vasodilator pathways in the brain, spinal cord, and somatic nerves.

JOHN MARTIN, M D

Of 6 patients with Sturge Weber's disease 1 was cured 1 markedly benefited and the other 4 were treated too recently to permit determination of the result.

In 19 cases of arteriovenous aneurysm the diagnosis was verified by arteriography. Therapy is possible only if all of the afferent arterial branches can be ligated. This is often not possible as it would occasion too much damage to the brain tissue. The author could accomplish ligation of the afferent vessels in only 6 cases.

The angiotreticulomas comprised 13 per cent of all of the cerebellar tumors. The average age of the patients was thirty eight years. After general pressure symptoms the most important were those of vestibulocerebellar disturbance. Impaction symptoms were common.

Radical surgery was the therapy of choice. In 16 cases there were 2 deaths, one following pulmonary embolism, the other from meningitis. Fourteen patients were cured. The prognosis of these tumors is, therefore, excellent.

(KESSEL) WILLIAM C. BECK, M.D.

Oldberg, S. An Attempt to Explain the Quadrantanopsia in Tumor of the Temporal Lobe (Versuch zur Erklärung der Quadrantanopsie bei Schläfenlappentumor). *Acta med. Scand.* 1937 93: 339.

The relative lack of local symptoms in tumors in the temporal lobes seems to cause the great interest in the frequently associated defects in the visual field. This disturbance in the visual field usually develops rapidly, possibly after a previous stage of a chromatopsia and later amblyopia, before the absolute scotoma manifests itself. In a few cases the complete homonymous hemianopsia appears, but the more or less quadrantiform defect in the visual field with a distinct predominance in the upper quadrants is more common. The quadrant defects of the two sides are often incongruent with more extensive loss of vision corresponding to the side of the lesion. Macular vision is often unaffected. The pupillary reactions are usually given as normal and the hemianopsia as uncertain, but usually the latter are absent in most of the cases of partial hemianopsia. After operation and possibly after relief from pressure there is not rarely immediate restitution of the visual field.

With the described characteristic symptoms of quadrantanopsia in temporal lobe tumor the thought of some pressure effect comes to mind. Various authors have localized this pressure in very different parts of the visual tract. It has been shown that the different parts of the retina are projected in a regular manner to every part of the visual tract up into the cortex in the occipital lobe. This has been confirmed experimentally. In a cross section of the optic tract the upper median part is infiltrated by fibers from the upper retinal quadrant, the lower part by those of the lower quadrant and the region between these by the macular bundle with its greatest distribution

in the lateral part of the tract. In the lateral geniculate body the various fiber bundles are still more differentiated and more collected. Here especially in the posterior parts, crossed and uncrossed fibers also lie close together. The further course of the fibers from the lateral geniculate body toward the cortex has played a predominant rôle in the discussion on visual field defects in temporal lobe affections since it has been shown that the ventral bundle in the optic radiation at first in an anterior direction, courses in the temporal lobes and there surrounds the lateral horn before it turns backward toward the occipital lobe and the area striata.

Numerous operative and autopsy findings have shown that in advanced cases of temporal lobe tumor the optic tract and the lateral geniculate body are often exposed to direct pressure effects. Most authors also see in this the cause of the homonymous visual field defects which in this stage usually approach complete hemianopsia. As to the genesis of the quadrantanopsia appearing in the earlier stage of the type described above the opinions vary. Most investigators including Cushing speak of a pressure effect upon Meyer's temporal loop possibly even with its destruction. This explanation seems likely, especially in regard to its agreement with the previously mentioned observation that the defect is usually localized in the upper visual field quadrants.

The cause of the homonymous quadrantanopsia in temporal lobe tumor is still unsettled. The majority of authors believe that the expansive pressure exerted by the tumor plays a decisive part, but opinions differ as to its localization in the visual tract. The most popular hypothesis is that this pressure affects the visual radiation, is not supported by clinical observations and is contradicted by many. The occurrence of pressure directed against the optic tract by a closely adjacent temporal lobe in the case of an expansive process there, has often been verified at operation or autopsy. In order to produce a quadrantanopsia the pressure would have to localize itself selectively on the cross-section half of the optic tract. This is very unlikely as the pressure localized upon a relatively large surface would have to produce a like tension of all the fibers in the cross section. Hirsch's observation, that the central visual tract, namely the optic chiasm, is particularly resistant to such pressure also denies the possibility of this selective pressure effect.

In order to show that local nutritional disturbances may also play an important rôle in this problem the author describes the vascular supply of the optic tract and the lateral geniculate body. From the internal carotid artery the anterior choroidal artery passes posteriorly. This small but constant artery lies close to the underside of the optic tract and follows it to the lateral geniculate body. The vessel in its passage gives off branches to the optic tract and to nearby parts of the base of the brain and pons, and its terminal branches course to the choroid plexus and the lateral geniculate body. Every

nucleus has a special blood supply, and of such a type that the anterior chorioid artery supplies the lateral parts of the lateral geniculate body and the posterior chorioid artery supplies the median and lateral parts. An intermediate zone between these vessels shows a relatively better perfusion and receives two branches from the two mentioned arterial stems, but chiefly from the posterior chorioid artery. It is thus shown that the anterior chorioid artery in the greater part of its course is wedged between the optic tract and the temporal lobe. Pressure exerted by the latter affects particularly this vessel, and because of the relative firm consistency of the tract, compression of the artery might easily result. The resulting local ischemia in the lateral part of the lateral geniculate body must result in a homonymous, bilateral, upper quadrantanopsia, of the usual type found in temporal-lobe tumor. It is very difficult to present evidence for the correctness of this theory, but a few cases from the literature confirm it. Several authors have found, in most of the cases of quadrantanopsia of the type described, signs of a general vascular injury, often lues or arteriosclerosis. Occasionally the defect is limited to chromatopsia. Absolute hemianopsia has often been observed to follow hemi-achromatopsia in cases of brain tumor. Achromatopsia often disappears after decompression. In hemianopsia of the transitory type restitution has been observed to follow the passage of a stage of hemi-amblyopia with subsequent hemi-achromatopsia.

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JOHN MARTIN, M.D.

LOBECTOMY AND PNEUMONECTOMY

A Collective Review from January, 1936, to July, 1937

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THE past year and a half have been a significant period in the development of lobectomy and pneumonectomy. This period has followed immediately on those recent years when it was demonstrated that resection of the lung was not only possible in the human but was applicable in a much broader sense than was considered possible heretofore.

Monod and Bonniot (31) have divided historically the evolution of pneumonectomy into three stages (the same stages of development might also be applied to lobectomy): (1) the experimental stage from 1831 to 1900 beginning with the demonstration of Gluck that the removal of an entire lung could be tolerated in the experimental animal; (2) the stage of preparation, from 1900 to 1918, during which time the obstacles of open pneumothorax were overcome, and (3) from 1918 to the present, during which time there has been a realization of accomplishment of the operation in man. The beginning of the third period, that of accomplishment, probably should not be dated quite so far ahead as the work of Brunn (7) in 1909 and Shenstone (46) in 1932 actually launched lobectomy in the thoracic clinic. The period of accomplishment in pneumonectomy came even later. According to Mason, (27) Kummel performed the operation in man and other attempts were made by Meyer, Lihenthal and Archibald. The first successful total removal of the lung by Nissen was not done until 1931. The past one and a half years have therefore followed closely upon the origins of these operations and mark the beginning of the period of elaboration and standardization.

LOBECTOMY

The subject matter of the majority of recent publications on lobectomy has been concerned primarily with the report of successful operations performed for bronchiectasis, with a discussion of variations in the surgical technique. A total of 63 cases have been reported. Individual case reports from foreign clinics have been made by Monod (9), Coryn and Clerens (10) (France), Pieri (38) (Italy), Roberts (43) (England) and Kirschner (23) (Germany). In this country Head (10) and Harrington (18) have published case reports. O'Brien (33) and Churchill (9) have

reported a series of cases and have discussed their experiences to date.

The history of lobectomy is replete with variations in technique and divergences of opinion regarding fundamental points. In the recent reports however one finds a surprising unanimity of opinion concerning the treatment of the pedicle of the pulmonary lobe. The use of a tourniquet excision of the lobe immediately following ligation suturing of the stump with multiple ligatures and closed drainage by means of a catheter have been carried out by all operators in much the same way. All with one exception prefer to make a clean cut removal of the involved lobe once the circulation to that lobe has been shut off. Nissen (32) described a multiple stage technique in which there is delayed strangulation of the involved lobe. At the first stage the hilum of the lobe in question is encircled by a rubber tube, which is later to act as a tourniquet. On subsequent occasions, approximately ten, twenty-one and twenty-eight days later, the tube is tightened to shut off gradually the circulation to the lobe. In the case reported the necrotic lobe was finally removed on the thirty-fourth day. Nissen believes that such a delayed ligation is safer than the strangulation method of Alexander, as the sloughing of the lobe occurs in the presence of adhesions.

Recent reports on lobectomy carry on the controversy concerning the one stage and the two-stage operations. The surgeons in Great Britain have adhered consistently to the one stage procedure and there is a definite tendency in this country toward more extensive use of the single operation. Even though all are willing to admit that the one-stage operation is the ideal procedure there are some surgeons in this country and in France and Germany who maintain that a two-stage operation can be carried out in a case in which the pleura is free and will always be safer than the one stage procedure. All authors with the exception of three however have used the one stage operation and essentially the technique of Brunn and Shenstone. Forty-two of the total of 63 operations were done in one stage and only 1 death in each group was reported. These figures in no way represent the operative mortality in

cases of lobectomy during this period inasmuch as most reports were of individual successes without comprehensive reports of the experience of each author. Only two papers giving a report of a complete series of cases have appeared during the period in question, one by Churchill (9), the other by O'Brien (33). Churchill reported 19 one-stage operations with no deaths and 19 completed two-stage operations with 1 death. O'Brien reported 1 death in a series of 15 operations done in one stage.

Churchill has taken the position that there are places for both the one-stage and the two-stage procedures, his indications are given in Table I. Two considerations have been brought up by Churchill (9), which may have been factors in the excellent results he has obtained. He advocates a closed season for lobectomy in cases of bronchiectasis to correspond with the cycles of respiratory infections in the community. In general he prefers not to operate from the middle of December until the first of May. Churchill also felt it advantageous to delay for a period of six weeks or more between stages if a two-stage operation had been decided upon. The delay between stages permits the patient to receive the benefits of an improved general condition so that he faces the hazardous step of the surgical program in a better condition than ordinary methods of pre-operative care can bring about. The improvement is thought to be due to a release of firm adhesions binding the affected lobe to the costophrenic sulcus, and to the temporary compression and collapse of the lobe by residual pneumothorax and pleural effusion.

Monod (29) has presented an excellent critique of the advantages and disadvantages of the two-stage lobectomy when the pleura is free. The following features are considered objectionable to the two-stage operation: (1) there is a double

operative risk, (2) the dissection is more difficult, (3) treatment of the pedicle is less precise, (4) the resection of the lobe is incomplete, and (5) bronchial fistulas are longer in closing. Because of these difficulties Monod favored the one-stage operation in the dry hemorrhagic type of bronchiectasis and when the lesion was small, and in all cases in which the pleura was adherent. The important objections to the one-stage procedure in the presence of a free pleura are considered by Monod to be: (1) a greater likelihood of immediate cardiopulmonary mechanical changes, (2) infection of the pleura, mediastinum, or other pulmonary lobes, and (3) tension pneumothorax. Monod maintained that the possibility of serious consequences from infection in the event of a free pleura is too great to justify routine use of the one-stage procedure. He, therefore, preferred a two-stage operation in the majority of cases of suppuration of the lung if the disease had not been associated with a previous pleurisy. He mobilized the involved lobe, covered it with gauze, and permitted the end of the gauze to project through the wound which had been closed so as to be air tight. Three weeks later the wound was reopened, and the lobe amputated after application of a tourniquet and mass ligatures.

In Germany, two-stage procedures are favored. The technique of Nissen has been commented on. Sauerbruch (45) has advocated the use of a preliminary extrapleural paraffin pack to incite the formation of adhesions. The lobe is excised at the time of the second operation. Sauerbruch advised a subtotal resection in order to have tissue with which to cover the stump. Nissen has abandoned the preliminary extrapleural paraffin procedure since he has observed that this method has at times failed to produce the desired symphysis of the pleural surfaces. Kirschner (22) believes it is important to suture the drainage tube to the bronchial stump in order to insure adequate drainage when the sutures in the bronchus are absorbed and the bronchial fistula forms. He considered that such a method, for all intents and purposes, carries the bronchial stump beyond the pleural cavity, and avoids the complications of a large bronchopleural fistula.

Minor modifications of the Brunn-Shenstone technique have been suggested. O'Brien used three Pezzer catheters instead of a single catheter to facilitate drainage and re-expansion of the remaining lobe during the early postoperative period. Harrington, in preparation for lobectomy in a case of bronchiectasis, carried out a preliminary paralysis of the phrenic nerve and preliminary pneumothorax. Pieri found that peridural

TABLE I

One-stage Operation

Obliterated pleural space or strong adhesions binding upper lobe to chest wall
Children
Middle lobe resections
Severe hemoptysis
Lobar atelectasis particularly if upper lobe does not show emphysema
Draining thoracotomy sinus or bronchocutaneous fistula
Cutting into infected lung when freeing adhesions
Bronchial stenosis

Two-stage Operation

Adults with free pleura
Febrile patients with active pneumonitis
Patients treated for a prolonged period with artificial pneumothorax and not having an adherent upper lobe
Bilateral cases with free pleural space

anesthesia as described by Dogliotti was satisfactory from the standpoint of quiet respiratory action during the operative procedure

LOBECTOMY IN BILATERAL BRONCHIECTASIS

Recent reports indicate less hesitancy in embarking on a program of surgical treatment in cases of bilateral bronchiectasis. Lewis (23), Churchill (9), and Overholt (35) have reported successful bilateral operations, and added 6 cases to the only other case, that of Eloesser, reported before this time. Overholt pointed out that it is just as logical to consider the removal of two or three lobes from different sides as to remove the same number of lobes from one side, as in pneumonectomy. In the case which Overholt reported three lobes were removed, the right, the middle and lower, and the left lower. In this patient the two upper lobes practically filled the entire chest, as the involved lobes were completely atelectatic. The upper lobes were therefore responsible for all respiratory function before the diseased lobes were excised. No physiological or anatomical alteration in respiratory function followed. Overholt suggested that in cases of bilateral disease without atelectasis of the involved lobes a two-stage operation be considered on the grounds that the first stage produces a shrinkage of the involved lobe. There is a gradual expansion of the remaining lobe and thus the remaining lung is prepared for the added burden before the excision is finally accomplished.

LOBECTOMY FOR LUNG ABSCESS

Once a pulmonary lobe has been destroyed by disease the primary excision of that lobe may prove to be the safest and shortest way out of the difficulty. There is a growing feeling that certain patients with an abscess of the lung can be treated more satisfactorily by lobectomy than by thoracotomy or pneumonectomy, by means of cautery. Monod (30) reported a successful case in which lobectomy was carried out after external drainage had failed to relieve the symptoms. Monod discussed the value of lobectomy in the treatment of abscess of the lung; he believes it is more beneficial from the standpoint of the sequelae of such an infection than for the abscess itself. In cases of multiple cavitation or associated bronchiectasis lobectomy should be considered. For an uncomplicated lung abscess Monod believes that thoracotomy should precede lobectomy, yet he grants that lobectomy may in the future be used as a primary surgical procedure. Bohrer (3) reported a case in which lobectomy was done for a central abscess of the right lower lobe, in which

there had been repeated massive pulmonary hemorrhages. A free pleura was found and a one-stage procedure was carried out.

Reports indicate, therefore, that there will be a much wider application of lobectomy as a primary form of treatment in lung abscess. The list of indications for consideration of lobectomy should include (1) extensive multiple cavitations, (2) bronchiectasis, (3) hemorrhage, (4) a massive thick walled single cavity in which more than one half of the lobe has been destroyed, and (5) older patients in whom malignancy cannot be ruled out.

LOBECTOMY FOR CARCINOMA

Recently there have been but 4 cases reported in which carcinoma of the lung was treated by lobectomy, a frequency no greater than that found in previous years. With a continued increase in the total number of lobectomies for other conditions and an increase in the number of operable tumors of the lung, it would seem that there has been a relative decrease in the use of lobectomy in the treatment of carcinoma.

Two of the 4 cases of lobectomy were reported by Jacobaeus (21), the operations were performed by Key. One patient died five weeks after operation and autopsy revealed metastasis to the mediastinum and brain. The second patient was living nine months after a right lower lobectomy was carried out, but was known to have metastasis to the pelvis. Rist, Monod and Jacquet (42) successfully performed a left lower lobectomy for peripheral epidermoid carcinoma in a patient sixty years of age. The patient was alive four months after operation without evidence of recurrence. Nissen (32) reported successful removal of the right upper lobe.

None of the 4 cases recently reported should be used in support of an opinion regarding the value of lobectomy in the treatment of primary carcinoma of the lung. In the first case reported by Jacobaeus metastasis was obviously present at the time of operation, and it was probably present in the second case as well. At the time the operation was done the resection of any amount of tissue by either lobectomy or pneumonectomy would not have cured the patient. In the other 2 cases reported, a sufficiently long follow up report to permit practical conclusions was not made.

Two anatomical studies have been made recently which have far greater bearing upon the applicability of lobectomy in cases of primary carcinoma of the lung than the recent case reports. Bonriot, Monod and Evrard (5) dissected 200 lung specimens hardened in formalin. A minute description of the vessels, nerves and

bronchi in the pulmonary pedicle is given. They found many variations in the number and the position of the branches of the vessels of the hilum, two of which are of practical importance. First, they found that certain branches of the artery to the lower lobe may originate above those to the middle lobe. Second, the arteries to the inferior lobe may produce a collateral circulation to one or two other lobes. They found no parallel between the branches of the artery, vein, or bronchus of either lung.

Bonniot and Dargent (4) carried out a very interesting study of the pulmonary pedicle in cadavers. Tourniquets were applied to the various lobes as practiced in the surgical clinic in performing lobectomy. The hilum was sectioned and the structures in the stump were studied. It was found that the tourniquet cord might injure (1) the pericardium, near the left pulmonary artery or inferior pulmonary vein, (2) the vena cava, vena azygos, esophagus, or vagus nerve, or (3) the vessels to the remaining lobes, especially when the tourniquet was applied to the upper lobe.

It also was found impossible to apply the tourniquet on the right upper or middle lobes close enough to include a tumor of the stem bronchus and at the same time not include part of the bronchus of the lower lobe. From these studies, it was concluded that carcinoma of the stem bronchus, especially that in the upper lobe bronchus, should not be treated by means of a tourniquet.

PNEUMONECTOMY

Pneumonectomy has been discussed to a greater extent in the literature during the past year and a half than in any previous period. As with lobectomy the greatest number of articles are concerned with the report of successful operations. It is of interest to note that during this period 19 operations have been reported, 15 (more than three-fourths) of which were done for conditions other than malignancy. In the early days of pneumonectomy the procedure was considered to be such a daring step that the majority of the operations were reserved for carcinoma. It is also interesting to note that only 2 operative deaths (13 per cent) were reported in the non-cancerous and younger group of patients. In the 4 cases in which pneumonectomy was performed for malignancy, in patients of middle age or older, 2 operative deaths occurred.

Although the articles on anatomical and physiological alterations in the thorax after pneumonectomy has been performed are less in number, they contain detailed descriptions of technical

procedures in man and are by far the most important contributions of the period.

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS

One of the early questions raised as a result of successful surgical removal of an entire lung was, "What is the future of the remaining lung?" Roentgenograms of the thorax and studies made at post-mortem examination have shown an increase in the size of the lung as well as a readjustment of the position of the thoracic viscera and thoracic walls. In two early articles dealing with the subject opposed views were presented. Hilber (20) in 1934 said that the increase in the size of the lung, at first the result of simple distention of the alveoli, was gradually altered by a true regeneration of normal lung tissue, accomplished by new growth. This entailed an increase in the number of the units containing new alveoli of normal size and structure and remodeling of the bronchial tree. The second view, presented by Rienhoff, Reichert, and Heuer (41) in 1935, was that there occurred a simple dilatation of the respiratory units, made up of the bronchiolus respiratorius, the ductus alveolaris, the atria, the sacculi alveolares, and the alveoli. They observed no evidence of true hyperplasia or hypertrophy.

Bremer (6) has found that both of these views are correct depending on the age of the individual. True regeneration may take place by means of new growth of normal alveoli and respiratory units, marked by the presence of tubular sprouts, which apparently are projections from the alveolar wall. The number of alveoli may be increased and the number of lobules increased without a change in the size of the individual units themselves. Regeneration occurs in the young, and dilatation in those whose lungs have ceased growing. Bremer also stated that in the rat and possibly other rodents in which normal growth continues throughout life, regeneration of lung tissue in adult forms might be expected. Bremer also pointed out that simple dilatation of the alveoli would give only a little more respiratory surface than in the original lung, the increase is due to the lengthening of the alveolar walls. The physiologically dilated lung might also be at a disadvantage in that the air would not be so finely divided and would thus lower the ratio of air surface to air bulk.

Rienhoff (39) has reported observations made at autopsy in 2 cases of congenital absence of one lung, in 2 cases of post-traumatic atrophy of one lung, and in patients who had died at variable periods of time after pneumonectomy had been

performed. He found compensatory dilatation of the alveoli but no fragillation of the elastic tissue surrounding the definitive respiratory unit. Rienhoff chose to term the change in the remaining lung "compensatory dilatation" and not "emphysema," which, he pointed out, is a pathological condition in which there is an interruption of the elastic tissue. He was not able to elicit any evidence that the compensatory dilatation which occurs in the remaining lung after pneumonectomy has been carried out was harmful either in man or animal.

Longacre, Carter, and Quill (24) carried out a series of comparative tests on dogs before and two months after left pneumonectomy had been performed. They attempted to determine the efficiency of the cardiorespiratory system by studying the physiological response to varied degrees of moderate strain. They found that in pneumonectomized animals, one one and a half, and two months after operation, a sufficient cardiorespiratory reserve was present for resting conditions and for moderate exercise. Under varying amounts of strain, however, the animals showed proportionate embarrassment. In terms of ultimate strain on the cardiorespiratory unit by means of the anoxemia test, the critical level of oxygen for the normal animals before pneumonectomy was done revealed a clear cut end point of between 5 and 6 per cent oxygen. Two months after pneumonectomy had been carried out this value had risen to 11.3 per cent oxygen. Four months after operation the critical level was back to 9 per cent. Other tests run months after operation also showed less embarrassment, due to compensatory changes, as evidenced by (1) an increase in the tidal air, (2) an increase in the subtidal lung volume, and (3) increase in the hemoglobin.

These observations substantiate clinical observations in regard to the status of the pneumonectomized patient. Within six months or a year after operation such patients carry out the ordinary activities of life with perfect ease. With anything more than moderate exertion, however, the pulse and respiratory rates may be increased and the patient may become dyspneic.

TECHNICAL CONSIDERATIONS

Two recent publications (Rienhoff (40) and Overholt (36)) have dealt entirely with technical matters in performing pneumonectomy. Rienhoff alluded briefly to a pre-operative method of preparing the pleura by inducing a lining of granulation tissue to form on the pleural surfaces. It is not made clear in the article just how this is

accomplished. Rienhoff used an anterior approach and found it helpful to carry out the dissection of the hilum by opening the mediastinal pleura and ligating the pulmonary artery in the superior mediastinum. The pulmonary veins were treated intrapleurally. The cartilaginous ring of the bronchus was clipped circumferentially. Ligation was accomplished by either an encircling ligature of silk or by means of interrupted silk sutures. In the dissection of the right pulmonary artery, Rienhoff considered it best to approach the vessel from its posterior aspect as there was nothing between the posterior wall of the pulmonary artery and the primary bronchus but loose areolar and lymphoid tissue. Rienhoff employed tribromethanol in amylene hydrate, 80 mg. per kgm. of body weight as a basal anesthetic and supplemented it with nitrous oxide. An intratracheal tube was not used.

Overholt (36) has described in detail the technique of performing pneumonectomy as employed in 11 cases. He is convinced that the period of preparation by producing pneumothorax (from three to six weeks) should be sufficient for complete readjustment of the remaining lung. Indications have been found for the use of either an anterior or a posterior approach and both were used with equal frequency. Admittedly, the anterior approach is the shortest route and permits inspection and palpation of the anterior mediastinum before the lung itself is mobilized. It was used in lesions of the stem bronchus when a free pleura had previously been demonstrated by pneumothorax. It was pointed out by Overholt that the posterolateral approach was advantageous when (1) the lung was infected and there was potential danger of pleural contamination as in bronchiectasis and multiple abscesses, (2) when a rapid operation was required and when the tourniquet and mass treatment of the hilum was contemplated, and (3) when difficulties in mobilizing the lung were contemplated. The posterolateral incision provides a wide exposure of the hemithorax, permits a more rapid and precise mobilization of the lung to be carried out and affords an approach to the hilum from all four directions, rather than a limited anterior and superior approach as obtained with the anterior incision.

Three papers relating to technique have appeared in the foreign literature. O'Shaughnessy (34) carried on experiments for the purpose of throwing light on the causes of sudden death when the region of the lung root was being operated on. The work of Morrison was reviewed. He found that rabbits survived pneumonectomy

only if the vagus was divided in the neck as a preliminary procedure. O'Shaughnessy demonstrated a slowing of the pulse and a drop in the blood pressure if traction was made on the lung root. Electrical stimulation of the same region was followed occasionally by apnea and by an increase in the pulse rate. It was found that atropine failed to abolish the reflexes. Topical application and subpleural injections of solutions, such as percaïne and novocain, abolished the respiratory reflexes, but the cardiovascular reflexes remained uncertain. It was concluded, however, that blocking of the vagus stem was no safeguard against reflex disturbances.

Dargent (11) made observations on the effect, both immediately and later, of pneumonectomy in rabbits and dogs. Little influence on the blood pressure was found. Traction on the vena cava near the auricular orifice produced extra systoles, and this region seemed to be the most sensitive region around the lung root. During the ligation of the bronchus no change in vital functions was noted. Dargent ingeniously measured the pressure of the pulmonary artery by cannulization of the left pulmonary artery as a preliminary step, closure of the thorax, then massive ligation of the right pulmonary pedicle. There was a transitory increase in the pulmonary pressure but for the most part the pressure remained constant. From Dargent's researches it was concluded that in the performance of pneumonectomy it was important to use preliminary pneumothorax, to employ positive-pressure anesthesia, to handle the tissues in the region of the hilum with extreme gentleness, and to ligate the arterial branches first. In observing the later effects Dargent reported changes in the remaining lung similar to those found by Rienhoff.

Defrise (13) recognized, as do all thoracic surgeons, that the three most important problems in performing pneumonectomy are anesthesia, bronchial closure, and the fate of the dead space in hemithorax. When pneumonectomy was performed experimentally Defrise used an automatic "spiropulsator" which permitted a rhythmic increase and decrease in the intrabronchial pressure during anesthesia. He considered the alternate insufflation under hyperpressure and practical standstill of the inflated lungs, the Meltzer-Auer procedure, to be undesirable. The bronchus should be sutured carefully transversely. Defrise advised that a window should be placed in the mediastinum to facilitate the extension of the contralateral lung into the dead space. This, he believed, decreased the pull on the mediastinum.

CASE REPORTS OF PNEUMONECTOMY

During the period in question 15 cases were reported in which pneumonectomy was carried out for non-carcinomatous pulmonary conditions, the majority being bronchiectasis (Table II). A basal anesthetic supplemented by the administration of nitrous oxide was the usual anesthesia. The hilum was treated with a tourniquet or clamp with mass ligation in all cases. Drainage was used also quite universally. Thirteen of the 15 patients (86 per cent) recovered.

Each author reported various modifications in technique. Arce (1, 2) packed the pleural cavity with gauze, the end of which was permitted to emerge from the wound. The gauze was removed on the fifteenth day. Mason (28) carried out a mass ligation and a delayed excision of the necrotic lobe, Alexander's lobectomy technique, in 3 cases. In 3 other patients the first stage consisted of a removal of the lower lobe and the second stage of removal of the upper lobe. Walker (47) severed the pedicle with a diathermy cutting current. Both Roberts (44) and Edwards (16) cut the phrenic nerve at the time of operation, and the latter used a streptococcic vaccine pre-operatively.

Reports of 4 cases in which pneumonectomy was done for malignant conditions have appeared during this period. Undoubtedly there are many other cases, the reports of which are being prepared. Lyle (25) successfully removed the right lung of a patient sixty-one years old for a lesion originating in the upper lobe. Unfortunately, enlarged and firm glands were found in the hilum. The patient lived five months. Flick and Gibbon (15) removed the left lung in a patient forty-five years old in whom evidence of an extension of the tumor to the mediastinal glands and pericardium was found. The patient lived two and a half years after operation. Arce (1) reported 2 cases in which pneumonectomy was carried out for carcinoma, the right lung was involved in both cases. He used cyclopropane anesthesia, a Wertheim clamp to control the pedicle, and gauze tamponade placed within the chest. One patient lived eight hours, the other forty-eight hours after operation.

The recent reports of 4 patients on whom operation was performed for carcinoma of the lung and in whom death occurred might be discouraging. The number is limited. In the 2 cases in which operation was carried out, metastatic involvement was present at the time of resection of the lung. Neither of these cases, therefore, can be used in an appraisal of the value of the operation. The relatively low mortality in the non-

TABLE II—REPORTED CASES OF PNEUMONECTOMY JANUARY 1936 TO JULY, 1937

Author	Age yrs	Diagnosis	Side	Anesthesia	Number of stages	Treatment of hilum	Operative recovery	Latest result	Remark
Mason C A (4) (28)	33	Bronchiectasis	Left	Avertin intravenous	1	Mass ligation	Yes	Living 18 months	Delayed exclusion of necrotic lung, 1 to 30 days after ligation 1 peckle
	38	Bronchiectasis	Right	Avertin intravenous	1	Mass ligation	Yes	Living 15 months	
	7	Bronchiectasis	Left	Avertin intravenous	1	Mass ligation	Yes	Died at second stage	
	10	Bronchiectasis	Left	Avertin intravenous	1	Mass ligation	Yes	Living 6 months	Separate 2-stage resection of lower lobe 3 months to 1 year later one-stage resection of upper lobe
	21	Bronchiectasis	Left	Avertin intravenous	1	Mass ligation	Yes	Died 24 hours after second operation	
	8	Bronchiectasis	Left	Avertin intravenous	1	Mass ligation	Yes	Living 5 months	
Edwards T (43)	7	Bronchiectasis	Left	Avertin intravenous	1	Tourniquet	Yes	Well	Pre-operative injection of a tetanus streptococcal vaccine Phrenic nerve (separated) operation
	10	Bronchiectasis	Right	Scopolamine intravenous	1	Tourniquet	Yes	In hospital	
Churchill E D (9)	10	Bronchiectasis	Left	Avertin intravenous	1	Tourniquet	Yes	Well	Interrupted sutures in hilum with 100 per cent ligature Thorne plastic 3 months later
	7	Bronchiectasis	?	?	?	?	Yes	Died	
Aree J (2) (4)	11	Pleural abscess	Right	Ethylene	1	Clamp Mass ligation	Yes	Living 3 months	Packs pleural cavity with gauze after excision of all abscess
	?	Nodular tuberculous	Right	?	?	Clamp Mass ligation	Yes	?	
	?	Carcinoma	Right	Cyclopropane	1	Mass ligation	Yes	Died 8 hours	
	?	Carcinoma	Right	Cyclopropane	1	Mass ligation	Yes	Died 48 hours	
Walk R M (27)	?	Bronchiectasis	Left	Intravenous	1	Tourniquet	Yes	Well 5 months	Lung amputated by diathermy
Burnett W E (8)	8	Bronchiectasis	Left	Reginald	1	Tourniquet	Yes	Well 3 months	No positive pressure used
Rberts J E W (44)	5	Bronchiectasis	Left	?	1	Tourniquet	Yes	Well	
Lyle H M (15)	61	Carcinoma	Right	Colonic ether	1	Separate ligation	Yes	Died	Peripheral tumor with metastases to hilar glands
Flint and Gibbon (13)	46	Carcinoma	Left	Avertin intravenous	1	Separate ligation	Yes	Died 8 months	Pericardial and mediastinal metastases found at operation

carcinomatous group indicates definitely that extirpation of an entire lung is becoming a practical and feasible operation

GENERAL CONSIDERATIONS OF CARCINOMA OF THE LUNG

Success in performing lobectomy and pneumonectomy has stimulated clinical interest in the early recognition of primary carcinoma of the lung. What was before a subject for discussion around the autopsy table now must concern all physicians who treat patients complaining of symptoms referable to the thorax. Graham (17) in the Balfour Lecture before the University of Toronto School of Medicine, regarded the lungs as one of the most common sites of origin of malignant lesions such lesions occurring in the

lungs in from 5 to 10 per cent. It was pointed out also that from 75 to 80 per cent of the patients were subjects for a positive diagnosis. Graham has been unable to find any incontrovertible evidence that any patient who has primary bronchial carcinoma has been cured by radiation therapy and that operation pneumonectomy in preference to lobectomy, offers the best chance for cure.

Overholt (37) in conclusions based on a study of 23 patients who had primary carcinoma of the lung makes the statement that in all except 4 the lesion had originated in the stem bronchus. Examination of a specimen obtained at biopsy was positive in 15 of the 16 lesions of the stem bronchus so examined which indicated a high incidence of clinical discovery. Overholt

maintained that several facts regarding primary carcinoma of the lung make early diagnosis possible in a fairly large proportion of cases if the condition is kept in mind; (1) a persistent cough, a warning symptom, appears early; (2) a large majority of the growths originate in a stem bronchus and therefore can be visualized, and (3) the lesion of the stem bronchus is limited by cartilaginous rings and apparently grows slowly for a period of months until the infiltrating process breaks through these bounds. Overholt also emphasized that in the stem-bronchus type the usual roentgenographic appearance was that of atelectasis of a lobe. It is unusual to see a definite shadow of the tumor itself. In early lesions in which the obstruction is incomplete there may be no roentgenological evidence of any disease. Reliance for early diagnosis rests solely, in those cases, upon a bronchoscopic examination.

The peripheral or pneumonic form of primary malignant lesions, originating in the smaller bronchi or bronchioles, produces a different picture because of its location and non-connection with the major bronchi. In this form of malignancy metastasis is more likely to have taken place before clinical diagnosis can be made. In the series studied by Overholt extensions of the tumor were found in the majority of cases and in those in which operation was performed, subsequent events revealed that metastasis had been present at the time of operation.

Dargent (12) in his monograph on the surgical treatment of bronchopulmonary carcinoma also has taken the position that the type in which prognosis is most favorable is the stem-bronchus variety, that lesion which is invisible bronchoscopically.

A symposium on lobectomy and pneumonectomy was held at the French Surgical Congress in 1936 (48). Monod of Paris and Bonniot of Grenoble reported an incidence of from 7 to 8 per cent of pulmonary carcinomas compared to carcinomas in other parts of the body and they believed that irradiation was valueless. Treatment should consist of pneumonectomy by multiple ligations of the components of the pedicle. The importance of early diagnosis was stressed. At the same congress Edwards of London reported the results in 7 cases in which pneumonectomy was performed for bronchiectasis, the mortality was 28 per cent. In 6 cases in which the patients were from thirty-one to sixty-three years of age, pneumonectomy was performed for carcinoma with 2 operative deaths, 1 metastasis, and 3 survivals. The cases of Ed-

wards were not included in the summary of cases in this review since details were not included in the correspondents' report of the French Surgical Congress. Undoubtedly this entire series will appear in a separate publication.

ANESTHESIA

Anesthesia by inhalation, positive pressure, nitrous oxide, with or without basal narcosis (avertin) has been used more frequently than any other form. A number of departures from this type have been made. Lyle (25) used colonic ether, Pieri (38) used a peridural anesthesia, Lewis (23) used spinal anesthesia, and Burnett (8) recommended a local field block. Arce (1) preferred cyclopropane inhalation.

Magill (26) discussed anesthesia in thoracic surgery. He reported his experience with spinal anesthesia, with the use of percarne 1500, in 23 cases in which lobectomy or pneumonectomy was performed. Occasionally local infiltration was necessary for anesthesia of the upper limits of the incision. Magill found that patients were able to breathe well without the use of a mask and positive pressure, and rarely was it necessary to administer oxygen.

That nitrous-oxide-oxygen anesthesia in thoracic surgery may fall short of the ideal is admitted by Magill. He pointed out that nitrous-oxide-oxygen anesthesia implies at least some degree of suboxygenation and that alternate bouts of cyanosis and oxygen inflation are unlikely to enhance the prospects of cure in patients suffering from pulmonary disease. Magill stated that cyclopropane is a godsend in operations on the thorax and that the operator who is able to forego the advantages of diathermy in order that atraumatic anesthesia such as cyclopropane provides may be employed is amply repaid for his concession.

A general discussion of the anesthetic problems peculiar to thoracic surgery has been given by Eversole and Overholt (14). Attention was called to factors which reduce the lung volume and limit the absorption of anesthetic mixture. The poor tolerance of thoracic patients for anoxic states and the great failing of most anesthetic mixtures to provide high concentrations of oxygen were pointed out. Cyclopropane does, however, permit the administration of 80 per cent or more of oxygen, and at the same time a depth of anesthesia is obtained which approaches that of ether. The dangers of anoxemia are thus overcome. It was concluded that when general anesthesia was desired, cyclopropane more nearly approached the ideal than any other anesthetic.

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SURGERY OF THE THORAX

CHEST WALL AND BREAST

McClitrick L S. *Interstitial Radiation of Cancer of the Breast* *Ann Surg* 1937 106 631

This report concerns the effect of interstitial radiation with or without supplementary external radiation upon cancer cells in a given breast upon such cells in the lymph nodes within the reach of surgical dissection and upon borderline and inoperable cases.

The author states that the term "operable cancer" is applied to breast tumors which are freely movable on the chest wall with a sufficiently limited involvement of the skin to permit a wide removal of normal skin and closure of the resulting wound. Lymph nodes if present cannot be palpated above the lower part of the axilla, enlarged supraclavicular nodes are absent and the cancer is not of the so called inflammatory type.

In treating the patients included in this report from six to twelve 2 mgm needles and from twenty to forty 3 mgm needles of radium sulphate were inserted. The total dosage varied from 15,000 to 25,000 mgm hours. Two or three of the 2 mgm needles were placed above the clavicle and in the infraclavicular area. A 3 mgm needle was inserted over each intercostal space near the sternal margin and

usually two or three needles were placed parallel to the opposite sternal edge. Finally needles were introduced in relation to the tumor as follows:

The tumor was encircled by needles placed deep to it avoiding if possible insertion of the needles into the tumor itself. Whenever it was possible to do so a second layer of needles was inserted superficial to the growth and at right angles to the needles underneath. The needles were left in place seven days.

A slight erythema of the skin was usually present at the time of removal of the radium needles. This erythema increased for as long as two or three weeks after treatment and not infrequently there was a loss of skin over the tumor bearing area. The skin reaction was widespread. After from six to eight months the entire breast became edematous, firm, heavy and indurated. In several patients the breast became smaller. In either instance the resulting deformity was equal to that following amputation. The most disturbing and frequent after effect of treatment was pain along the free margin of the pectoralis muscle which was accompanied by a palpable thickening and partial limitation of abduction of the arm.

The diagnoses were made on a clinical basis but the author states that in almost every instance the

diagnosis was sooner or later confirmed by a pathological section, or by the clinical course of the disease. Ten of the 96 patients later submitted to amputation of the breast. Complete primary regression of the tumor had occurred in 5 of the patients. In 2 of these 5, no cancer was found, a mistaken diagnosis having been made in 1 case in which the tumor was benign, and in 3, cancer was proved pathologically following operation.

There were 26 operable cases treated with radium. Fifteen (60 per cent) of the tumors suffered complete primary regression, 3 (12 per cent) diminished by 50 per cent, and only 8 (28 per cent) proved to be resistant to radiation. The author states that even though complete disappearance of the mass did take place, the presence of cancer in small foci throughout the breast was not excluded by the failure to find a mass.

The author believes that the results obtained in inoperable carcinoma of the breast depend upon the size of the local tumor almost as much as upon its radiosensitivity. He prefers preliminary external radiation if there is extensive ulceration, then interstitial radiation.

EARL O. LATIMER, M.D.

Cohn, L. C.: Carcinoma of the Female Breast, with Special Consideration of Pre-Operative Irradiation: A Preliminary Report. *Arch. Surg.*, 1937, 35: 694.

Cohn presents a preliminary report on the pre-operative irradiation of carcinoma of the female breast based on a five-year study. Of 43 patients who received pre-operative irradiation followed by a radical operation, 71 per cent were living and free from recurrence for an average of one year and ten months after the irradiation. Of 51 patients who had a radical operation without pre-operative irradiation only 33 per cent were living and free from recurrence, but the average length of time since the operation was considerably longer, three years and four months. Of a third group of 42 patients receiving irradiation followed by the excision of the tumor, only 31 per cent were living and free from recurrence for an average period of two years and three months.

No evidence was found that pre-operative irradiation was of value in early cases of cancer in which there was no involvement of the axillary glands, but in the group which showed metastases to the glands, 44 per cent of the patients receiving pre-operative irradiation were well as compared to 24 per cent of those who had the radical operation alone. However, the difference in the time that had elapsed must be considered.

The reason for making a preliminary report of this work was that sufficient time seemed to have elapsed to indicate that there was apparently no danger in delaying a complete operation for one course of pre-operative irradiation provided a period of time, about two and a half or three months, was allowed between the irradiation and the operation.

LIZABETH M. CRANSTON

Devenish, E. A., and Jessop, W. H. G.: Swelling of the Upper Limb Following Radical Mastectomy. *Brit. J. Surg.*, 1937, 25: 261.

Radical mastectomy remains the method which gives the best results in treating operable carcinoma of the breast. It is therefore desirable to minimize the complications of the operation and such consequences as postoperative swelling, in the absence of recurrence of the carcinoma, on the upper limb on the affected side.

Postoperative, non-malignant swelling of the arm occurs in 1 of every 6 patients who have undergone radical mastectomy, and this swelling reaches a size sufficient to cause some trouble to the patient in more than one-third of the cases. It renders the limb heavy and fatiguing to use, causes disfigurement, necessitates the wearing of special sleeves in the patient's garments, and produces undue susceptibility to inflammation.

Marked shrinkage of the limb follows continuous elevation or suspension. Recurrence of the swelling is prevented by a light, thin rubber corset fitted to give uniform pressure to the entire limb.

J. DANIEL WILLEMS, M.D.

TRACHEA, LUNGS, AND PLEURA

Iselin, M.: Extrafascial Apicolysis—Semb's Operation (L'apicolysse extra-fasciale—méthode de Semb). *Presse méd.*, Par., 1937, 45: 1539.

Iselin reviews the principles and technique of the operation of extrafascial apicolysis as developed by Semb. The differences between the classical apicolysis of Tuffier with its endofascial separation and the extrafascial operation of Semb are shown, and emphasis is placed on the advantages of the latter procedure. The advantages are particularly marked in those cases in which, because of extensive pleuritis, the endothoracic fascia has become fused with the parietal pleura and no cleavage plane can be found between them. It is in these cases especially that an adequate collapse is most needed. By completely freeing the lung with its coverings from the fixed points about its upper borders, the Semb operation allows the lung to collapse along all axes toward the hilum. The lung is maintained in this collapsed condition by the regeneration of the ribs over its surface. This optimum collapse can be obtained by the resection of fewer ribs than were resected by any of the older types of thoracoplasty.

The results obtained with extrafascial apicolysis by Holst, Semb, and Frimann-Dahl, and by Overholt are quoted. In 1935 the former group reported on the late results in 105 patients and found that 77 had been rendered free from tubercle bacilli. The total mortality for the 138 patients operated upon was 7 per cent. It was only 3 per cent when fewer than six ribs were resected, 12 per cent when eight ribs were resected, and 19 per cent when a total thoracoplasty was done. In this latter group of 21 patients all but 6 operations were done in one stage. Overholt in his series of 106 cases never resected more than four ribs at any one time and reported a

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The diagnoses were made on a clinical basis but the author states that in almost every instance the

living patients, 90 per cent had complete closure of their cavities and 86 per cent had their sputum rendered free from tubercle bacilli. In the last three years, 93 per cent of 149 patients have had their cavities closed and 91 per cent have had their sputum freed from tubercle bacilli. It was necessary to resect more than 8 ribs in only 10 per cent of the patients. Among 17 patients with contralateral pneumothorax, there were no deaths, 14 of these had their cavities closed and their sputum freed of tubercle bacilli. Sixteen patients who had been unsuccessfully subjected to ordinary thoracoplasty were re-operated upon by the new method, with success in 14.

RICHARD H. MEADE, JR., M.D.

Laffitte, H : Intrapulmonary Teratoid Embryoma. Removal in One Stage (Embryome t ratoide intra-pulmonaire. Excr se en un temps) *M m P'Acad de chir*, Par, 1937, 63 1076

Laffitte notes that while intrathoracic tumors are rare, they are being recognized considerably more frequently with the modern methods of roentgenological study.

The patient in the author's case was a woman twenty-one years of age who had slight pain in the thorax five years before admission to the hospital. Two years later she began to cough, and had an occasional slight hemoptysis, hairs were found in the sputum. Before admission to the hospital the patient had shown considerable loss of weight. The roentgenogram showed a round opaque area with regular borders in the upper lobe of the left lung. After the injection of lipiodol, it was found that the opaque medium passed around the tumor. At operation the electric knife was used for section of the lung, there was no difficulty in enucleating the tumor as it was surrounded by sebaceous, fatty matter and was easily separated from the surrounding tissue. The patient's recovery was complicated by a pleuropulmonary pneumococcus infection, but she was discharged from the hospital in good condition. After she was discharged she rapidly gained in weight and had no symptoms except a slight morning cough.

The tumor which was removed was a solid growth of ovoid, irregular shape. Its outer surface was a

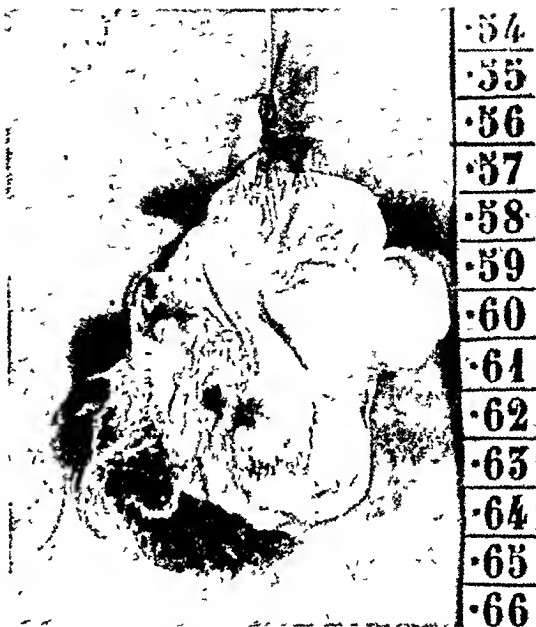


Fig 1 Photograph of the teratoid embryoma

thick skin with brownish well-formed hairs of varying length, "glued" together by a sebaceous material. The interior of the tumor was made up of pale yellow tissue with numerous cysts and a harder nucleus in the center. Histologically, the external layer of the tumor was epidermis. The tumor contained many different types of tissue, representing various organs, the cysts were lined with ciliated cylindrical epithelium of the pharyngeal type. The glandular formations included the salivary, the thyroid, and the thymus types. Muscular fibers interspersed with cylindrical mucous glands were of the intestinal type. The tumor also showed glands of the type of the islands of Langerhans in the pancreas, cartilage, and nerve fibers of the sympathetic type. It was therefore a teratoid embryoma.

ALICE M. MEALPS

mortality of 5.6 per cent. Twenty eight per cent of his patients had bilateral cavitation. Before using the Semb operation he obtained satisfactory collapse in 71 per cent of 133 patients since he has used it the figure has risen to 92 per cent of 98 patients.

Iselin does not give his own results with the operation as he considers them to be too recent to be of value. He expresses his enthusiasm for the Semb operation and emphasizes its particular importance in those cases in which a marked pleuritis makes the extrafascial apicolysis difficult for in these cases effective collapse could not otherwise be obtained. Instead of the usual type of incision he has for more than a year been using a muscle splitting incision for the posterior approach. At the time of the first stage operation he makes an anterior approach through two incisions, one axillary the other subclavicular. All of the first rib and part of the second rib are resected and the entire convexity of the pleural dome is freed from above and in front. At the second stage operation three weeks later a muscle splitting posterior incision, based on the incision described by Picot of Lausanne, is used, and the next four, five, or six ribs are resected. Also at this time he carries out an extrafascial separation of the posterior surface of the lung, the postero-superior angle and the mediastinal aspect. He limits the extent of the first stage to the resection of four ribs and apicolysis. He has had excellent results and the types of incisions used have decreased the amount of deformity and disability.

RICHARD H. MEADE, JR., M.D.

Semb C. Thoracoplasty with Extrafascial Apicolysis *Brit M J* 1937 2 650

Semb believes that thoracoplasty should be concerned primarily with the closure of cavities. This closure should be obtained with the minimum interference with normal lung tissue and should carry an operative mortality of 3 per cent or less. This conservation of the maximum amount of normal lung tissue makes possible the application of collapse therapy to bilateral cases. Knowledge of the low operative mortality will help to prevent patients from postponing operation to too late a period or from refusing it altogether.

A study of 177 cases chosen for thoracoplasty showed that in 90 per cent the cavities were confined to the upper lobes. In 84 per cent of a series of 102 unselected cases the posterior part of the lungs was found to be the location of the cavities. Thoracoplasty is thus concerned mainly with the upper and posterior parts of the lungs.

The most perfect type of pulmonary collapse is obtained by means of artificial pneumothorax in the absence of adhesions. This concentric relaxation is not obtained by the ordinary methods of thoracoplasty. The addition of extrapleural apicolysis improves the collapse but does not produce a permanently effective one. However the use of extrafascial apicolysis in conjunction with radical selective thoracoplasty gives a permanent and effective

collapse. In this procedure the division of the suspension bands of the lung allows concentric collapse of the mobilized lung. The perosteum of the resected ribs is allowed to remain attached to this surface though separated from its attachments to the vertebral column and the sternum. Later regeneration of the ribs will maintain the lung in its new position.

Local block anesthesia with 0.5 per cent novocaine and 0.5 per cent pantocaine is used by Semb in performing his operations. He finds that this allows quiet respiration, preserves the cough reflex and decreases hemorrhage. In apprehensive patients small doses of evipan or pentothal are given intravenously.

The division of the operation into stages and the resection of from only 2 to 5 ribs at a time is important. The apicolysis is done at either the first or second stage, the condition of the patient being the deciding factor. The extent of rib resection is regulated by the position of the cavity and the mobility of the underlying lung. A close relationship between the extent of the operation and the postoperative reaction has been observed. Between the period from 1932 to 1937, 246 patients were operated upon in one or more stages. The mortality was 6 per cent within two months and 5 per cent later. From 1934 to 1937 149 patients were operated upon in several small stages with a drop in mortality to 3 per cent within two months and 3 per cent later. Pulmonary complications occurred less frequently when small operations were done. When 3 or 4 ribs were resected and an apicolysis was done there were pulmonary complications in less than 5 per cent of the cases. When more ribs were resected at one stage the figures mounted to 9.25 and 61 per cent the percentage of complications depending on the number of ribs that were resected.

Phrenic paralysis should not be used prior to thoracoplasty as it handicaps normal lung tissue and increases the risk of pulmonary complications after thoracoplasty. It may be of value after thoracoplasty in completing collapse of the diseased lung.

Extrapleural pneumolysis with plombage is more dangerous and less effective than thoracoplasty with extrafascial apicolysis. It should not be used before a thoracoplasty as the fibrotic reaction about the paraffin interferes with mobilization of the lung.

In patients who have had an ineffective pneumothorax it is important to allow the lung to re-expand before thoracoplasty is started as its presence needlessly cuts down on the respiratory surface and makes the danger of emphysema more likely.

In the prevention of wound infections Semb now excises the intercostal muscle over the mobilized lung as their devitalization by interruption of their blood supply encourages infection. Drainage is not used unless there is much oozing and then only for twelve to twenty-four hours.

Of 246 patients who were operated upon in the period from 1932 to 1937 219 survived. Of these

appetite, and pain were the paramount features. At operation, a large tumor-like mass was felt and seen in the retroperitoneum. It was semi-hard and fixed and entirely inoperable. No section was taken as this was deemed inadvisable and dangerous. The abdomen was closed with a diagnosis of sarcoma. To make a long story very short, this tumor was entirely absent within a period of from two to three months. The young man regained his health and is now continuing his course in medicine. This unquestionably represented a granulomatous tumor of low-grade inflammatory type, probably originating in the retroperitoneal lymph glands. It represented a type of tumor which Mock describes.

It is to be said, however, that Mock's description did not embrace the definite concepts which we now have from Crohn. His concept of the pathology was that the hyperplasias were usually sterile and that the underlying cause of their formation was some local interference of the blood supply resulting in a small area of necrosis, this in turn was followed by reparative tissue reaction. Such granulomas revealed microscopically a mass of chronic granulation tissue with fibroblastic and lymphoid tissue surrounding areas of necrosis. Giant cells were occasionally seen. Many of these tumors, therefore, had easily been taken for carcinoma because of large groups of lymphoid cells, while in other cases the small round cells so predominated that the picture appeared to be that of sarcoma.

Mock enumerates the following causes and examples: (1) conditions existing within the gastro-intestinal tract itself or its mesentery, such as sigmoid diverticulitis, a hyperplastic mass developing at the site of a gastric ulcer (usually following a small perforation), polypi of the intestines, and foreign bodies within the intestines, (2) extra-peritoneal infections which gradually spread to and involve the gastro-intestinal tract, such as a low-grade infection in the retroperitoneal lymph glands and the chronic inflammatory changes seen in a constricted omental hernia, and (3) trauma from surgical accidents or extraneous injuries such as (a) ligatures or sutures which constrict and act as a local interference to the blood supply, or sutures which act as a foreign body, (b) foreign material, such as sponges and instruments which are left in the abdominal cavity, and (c) trauma in general, such as undiagnosed mesenteric lacerations or rupture of the intestine.

Considerable space has been devoted to a review of this splendid article by Mock for the reason that he, for the first time, sharply differ-

entiates true granulomas represented by tuberculosis, and syphilis, from these infective lesions which simulate them. Some of the confusion was swept away. However, he and previous writers did not recognize the definite pathological or clinical entity which the term terminal or regional ileitis embraces.

There seems to be no doubt that Crohn and his associates with their astute observations and logical deductions finally swept away all remaining confusion regarding the classification of these similar conditions.

For the sake of summary then, it might be well to epitomize them. There are three types of granulomatous tumor-like masses which seem to fall into distinct and separate classes:

- 1 Those that occur in association with that class of specific diseases, namely, tuberculosis, syphilis, actinomycosis, Hodgkin's disease, and lymphosarcoma.

- 2 Those occurring with other conditions as described by Mock under the term of infective granulomas.

- 3 Those occurring with true regional, or terminal ileitis, a definite pathological and clinical entity.

Fate decreed that Crohn, Ginzburg, and Oppenheimer, in 1932, were to be given credit for the first accurate description and recognition of regional ileitis. This description was based on a report of 14 cases. So complete and meticulous was their description of this disease, so accurate were their observations, so logical their deductions, that the article stands as a masterpiece in medical literature. Very little has been added by subsequent writers to their original concepts of the disease. These additions will be referred to later. The article stimulated tremendous enthusiasm and interest in surgeons, internists, roentgenologists, pathologists, and research students. Many splendid papers have appeared since then and many more cases have been reported. The conclusion is inevitable that this disease must have gone unrecognized. It hardly seems possible that it can be new.

In this connection, I have just read an article under the caption, "Acute Abdominal Catastrophes" by Irvin Abell (1). Hyman I. Goldstein, Camden, New Jersey, in his discussion of the paper states, "On July 4, 1806, before the Royal College of Physicians, of London, Charles Combe and William Saunders reported a typically fatal case of terminal ileitis with 2 to 3 feet of the intestine involved, under the title, 'A Singular Case of Stricture and Thickening of the Ileum.' John Abercrombie (1780-1844) reported a case in a girl,

REGIONAL ILEITIS

A Review of the Literature and a Case Report

MAXWELL LICK MD, FACS Erie Pennsylvania

THE study of regional ileitis is fascinating. The disease has excited more wonderment and interest than any other surgical condition during the past few years. It seems incredible that this condition was not recognized as a specific entity until Crohn, Ginzburg and Oppenheimer (23) so beautifully described it in their classical monograph. The disease must have existed for centuries. One is reminded of the fact that medical science itself made a belated appearance all down through history in comparison with other arts and sciences. The sciences of physics, chemistry, and astronomy were well understood when medicine was still in its crude beginning. Nike of Samothrace (Winged Victory), Venus de Milo and the Laocoon, sculpture that has never been excelled, were produced a century or two before Christ. Homer wrote his *Odyssey* at a time when diseases were treated by superstitious rites or by the giving of horrid concoctions. Chaucer wrote the *Canterbury Tales* two centuries before the ligature was applied to an artery to control hemorrhage. Rembrandt had painted his great picture, *The Anatomy Lesson* two hundred years before Pasteur linked bacteria with disease, and Michelangelo was spreading his canvases with infinite beauty long before this. It was late in the nineteenth century that Lister began applying the principles which Pasteur taught and thereby developed antiseptic surgery. Accurate knowledge of anatomy was not attained until the 13th or 14th century. Appendicitis was not recognized except as inflammation of the bowels until comparatively recent times.

HISTORY AND CHRONOLOGY

The literature, prior to 1932, does make reference to a heterogeneous group of cases under various terms such as benign granuloma of the intestines, infective granuloma, various cancers and tumors in the abdomen and non specific granuloma of the intestine. The concept of early writers of regional ileitis was that of a tumor like mass characterized by the piling up of granulomatous tissue and exhibiting varying stages of necrosis, fibroblastic changes, and scar tissue. While many writers recognized these masses as non specific tumors, much confusion was apparent in their

classification. This error found its basis in the similarity to other tumor masses due to tuberculosis, syphilis, actinomycosis, Hodgkin's disease and lymphosarcoma. The very word itself granuloma, applied indiscriminately to all lesions gives evidence of this confusion. Most pathologists contend that the suffix, oma, always refers to a true tumor. The only distinction which differentiates these masses from true tumors noted by some of the early and modern writers is that they were called infective granulomas. This, of course, conveys the idea of an inflammatory tumor like mass.

Mock (68) says, "The literature of our country has dealt inadequately with these inflammatory granulomatous masses as a definite entity." The word has been used very loosely. He states that one of the first clinical reports of this condition dealing with the subject as a definite entity was made by Braun (52) in 1909. Prior to this and even until 1923 all cases were usually regarded as instances of hyperplastic tuberculosis of the intestine or other specific tumor masses. One of the first reviews of benign granulomas was made by Tietze (83) in 1910. In 1923, Moschowitz and Wilensky (60) contributed to the literature under the title of "Non-Specific Granulomata of the Intestine" and stated that the recognition of this condition thus far seemed confined to European observers and even then, the literature covered only the last decade.

It was Mock's splendid article "Infective Granuloma" in 1931 which revived interest in this unusual condition. He recognized that these tumor like masses were due to low grade inflammatory causes. He did not include in this group those specific granulomas such as gumma, tuberculosis, actinomycosis, blastomycosis, and anthrax. In other words he preceded Crohn in the recognition that they were a non specific type of lesion, sharply differentiated from specific or true granulomas.

A personal reference might be illuminating. A young medical student, twenty three years old presented a tumor like mass within the abdomen the size of a large grapefruit. He was thin, anemic, and in poor health. Moderate indigestion, loss of

appetite, and pain were the paramount features. At operation, a large tumor-like mass was felt and seen in the retroperitoneum. It was semi-hard and fixed and entirely inoperable. No section was taken as this was deemed inadvisable and dangerous. The abdomen was closed with a diagnosis of sarcoma. To make a long story very short, this tumor was entirely absent within a period of from two to three months. The young man regained his health and is now continuing his course in medicine. This unquestionably represented a granulomatous tumor of low-grade inflammatory type, probably originating in the retroperitoneal lymph glands. It represented a type of tumor which Mock describes.

It is to be said, however, that Mock's description did not embrace the definite concepts which we now have from Crohn. His concept of the pathology was that the hyperplasias were usually sterile and that the underlying cause of their formation was some local interference of the blood supply resulting in a small area of necrosis, this in turn was followed by reparative tissue reaction. Such granulomas revealed microscopically a mass of chronic granulation tissue with fibroblastic and lymphoid tissue surrounding areas of necrosis. Giant cells were occasionally seen. Many of these tumors, therefore, had easily been taken for carcinoma because of large groups of lymphoid cells, while in other cases the small round cells so predominated that the picture appeared to be that of sarcoma.

Mock enumerates the following causes and examples: (1) conditions existing within the gastro-intestinal tract itself or its mesentery, such as sigmoid diverticulitis, a hyperplastic mass developing at the site of a gastric ulcer (usually following a small perforation), polypi of the intestines, and foreign bodies within the intestines, (2) extra-peritoneal infections which gradually spread to and involve the gastro-intestinal tract, such as a low-grade infection in the retroperitoneal lymph glands and the chronic inflammatory changes seen in a constricted omental hernia, and (3) trauma from surgical accidents or extraneous injuries such as (a) ligatures or sutures which constrict and act as a local interference to the blood supply, or sutures which act as a foreign body, (b) foreign material, such as sponges and instruments which are left in the abdominal cavity, and (c) trauma in general, such as undiagnosed mesenteric lacerations or rupture of the intestine.

Considerable space has been devoted to a review of this splendid article by Mock for the reason that he, for the first time, sharply differ-

entiates true granulomas represented by tuberculosis, and syphilis, from these infective lesions which simulate them. Some of the confusion was swept away. However, he and previous writers did not recognize the definite pathological or clinical entity which the term terminal or regional ileitis embraces.

There seems to be no doubt that Crohn and his associates with their astute observations and logical deductions finally swept away all remaining confusion regarding the classification of these similar conditions.

For the sake of summary then, it might be well to epitomize them. There are three types of granulomatous tumor-like masses which seem to fall into distinct and separate classes:

1. Those that occur in association with that class of specific diseases, namely, tuberculosis, syphilis, actinomycosis, Hodgkin's disease, and lymphosarcoma.

2. Those occurring with other conditions as described by Mock under the term of infective granulomas.

3. Those occurring with true regional, or terminal ileitis, a definite pathological and clinical entity.

Fate decreed that Crohn, Ginzburg, and Oppenheimer, in 1932, were to be given credit for the first accurate description and recognition of regional ileitis. This description was based on a report of 14 cases. So complete and meticulous was their description of this disease, so accurate were their observations, so logical their deductions, that the article stands as a masterpiece in medical literature. Very little has been added by subsequent writers to their original concepts of the disease. These additions will be referred to later. The article stimulated tremendous enthusiasm and interest in surgeons, internists, roentgenologists, pathologists, and research students. Many splendid papers have appeared since then and many more cases have been reported. The conclusion is inevitable that this disease must have gone unrecognized. It hardly seems possible that it can be new.

In this connection, I have just read an article under the caption, "Acute Abdominal Catastrophes" by Irvin Abell (1). Hyman I. Goldstein, Camden, New Jersey, in his discussion of the paper states, "On July 4, 1806, before the Royal College of Physicians, of London, Charles Combe and William Saunders reported a typically fatal case of terminal ileitis with 2 to 3 feet of the intestine involved, under the title, 'A Singular Case of Stricture and Thickening of the Ileum.' John Abercrombie (1780-1844) reported a case in a girl,

aged thirteen with about 18 in of the lower end of the ileum involved. If we are to use an eponym for this clinical entity, let it be "Saunders Abercrombie Crohn's disease."

These cases have not been reviewed. The quotation is presented for what it is worth for completion of the argument. It is the opinion of the writer, however, that these reports should in no way replace the credit for the first description of this disease as a special entity by Crohn and his associates. These authors coined the name, 'terminal ileitis' and stated that the process involved the terminal ileum for a distance of from 20 to 30 cm. Subsequent reports indicated that it could be more extensive. They stated that the process stopped abruptly at the ileocecal valve and did not involve the cecum. The following year, however, Harris, Bell, and Brunn (53) questioned the limitation of the disease to the terminal ileum. One of their cases showed the identical lesion involving the jejunum. It was their belief that with more universal recognition of this disease process by surgeons, other cases involving the jejunum as well as the terminal ileum would be reported. They, therefore suggested the name 'chronic cicatrizing enteritis'. They believed that any part of the small intestine might be involved.

Brown, Barger, and Weber (13) in 1934 basing a report on 18 cases, stated that the lesion may occur in any part of the small intestine. In 4 of their cases, it involved the cecum and the terminal ileum. In 1 case it involved one section of the jejunum.

Following this report, Colp (17) reported a case in which the disease extended beyond the ileocecal valve into the cecum. He stated that the ileocecal valve did not arbitrarily limit the progress of the disease to the ileum. Following these manuscripts in which the writers noted that the disease attacked other portions of the bowel Crohn and Rosenak (24) in 1936 presented another report embracing an experience of 60 cases which were observed and operatively confirmed and enlarged their original pathological concepts to include a simultaneous inflammatory and ulcerative colitis. Of these 60 cases, 9 cases presented involvement of the colon. Crohn had been loath to accept the statement that this disease process could involve the colon because the original 14 cases all showed identical topographical involvement. Furthermore it had been observed that when a short-circuit operation was done the disease in the ileum never extended into the anastomosed colon. He called attention to an interesting observation in this connection, in wit that

ulcerative colitis is capable of involving the ileum by backwash. Colitis and ileitis of this type however, in no way resemble the hyperplastic granulomatous conditions of terminal ileitis.

On the other hand the regional ileitis which has spread into the colon is essentially that ileitis which must be considered as the dominant factor and as contributing to the main clinical features. The differentiation from primary ulcerative colitis is made on the basis of the lesser severity of the colonic involvement, the very mild degree of diarrhea in spite of high temperature and the presence of the predominating symptoms of ileitis, namely, the mass in the right ileac region, abdominal cramps and eventually ileac stenosis.

ETIOLOGY

Almost without exception all writers regard the cause of regional ileitis as obscure. No evidence of tuberculosis, syphilis, actinomycosis or lymphosarcoma has ever been found. Inoculation of laboratory animals has always proved negative for tuberculosis. Homans and Hass (55) injected macerated tissue from lymph nodes and serosa of the ileum into animals. They also made cultures under aerobic and partially anaerobic conditions. The animals all remained healthy and ten weeks after the injection the tissues were examined and no pathological lesions were disclosed. All cultures showed no growth.

Wassermann reactions are negative. All observers seem unanimous in their opinion that the appendix has no part in the cause of this disease although it is frequently removed prior to the recognition of the true condition.

Reichert and Mathes (78) suggested a possible causative factor. They injected irritating and sclerosing materials into the mesenteric and subseral lymphatics which led to a chronic lymphedema of the intestinal wall. They believe that the two dominant features are a low grade infection with a concomitant chronic lymphedema. Feisen (34) disagrees with the accepted pathogenesis of the disease. He believes that chronic non specific ulcerative colitis and regional ileitis either alone or as associated lesions are manifestations of bacillary dysentery. He states that it has been his privilege to describe 38 consecutive cases of chronic ulcerative colitis, 11 of chronic distal ileitis, 11 of acute distal ileitis, and 2 of non specific granuloma traceable to bacillary dysentery. On the other hand Crohn states that he has never had a positive culture for bacillary dysentery.

The general consensus of opinion is that the process must be considered bacterial in origin.

PATHOLOGY

The disease most frequently involves the terminal ileum. It may, however, involve any portion of the small intestine and the colon. Pathological conditions vary according to the stage of the disease. It is thought that it begins as small oval ulcers along the mesenteric attachment of the ileum. Harris, Bell, and Brunn (53) state that it must be remembered that few observations are available in the very early cases. Many of these have been mistaken for appendicitis and the appendix has been removed without disturbing the coexisting ileitis. As the process progresses, the typical findings are those of a greatly enlarged, soggy, purplish, blotchy red, edematous bowel. The bowel itself is heavy, the mesentery is thick and stiff and contains enlarged glands. As the disease progresses the lumen of the bowel becomes irregular, distorted, and narrowed. The mucosa is subject to destructive ulcerative processes and edema, which often gives to it a bulbous or cobblestone appearance. The ileocecal valve is frequently converted into a rigid diaphragm with a small opening. Fistulous tracts, due to small perforations into contiguous structures, may result and in late stages are a constant and characteristic feature of the disease. The diseased bowel becomes adherent to contiguous structures and in order of their frequency, fistulous tracts occur in (1) the sigmoid, (2) coils of the ileum, (3) the cecum, (4) the ascending colon, (5) the hepatic flexure, and (6) the abdominal wall.

The tactile impression of this diseased bowel is strange and significant. One gets the impression of a heavy-bodied snake as he lifts it in his hands. It does not have the consistency of a soft lead pipe as has been suggested by other writers. It is more flexible than this, more elastic, and softer. There is nothing particularly significant in the microscopic anatomy. Marked inflammatory hyperplastic exudative, necrotic, and reparative changes are noted. These may take the form of acute, sub-acute, or chronic inflammation. Giant cells are commonly found. These are probably accidental due to the reaction against foreign material. The finding of these giant cells frequently leads to a diagnosis of tuberculosis.

CLINICAL FEATURES

The disease predominately attacks young male adults. Rosenblate, et al (80) reports 1 case in a boy four and one-half years old. Mixer (67) reports his oldest patient as being fifty-six years old, and states a high incidence among Hebrews. Statistics from the Mayo Clinic (91) reveal that

their youngest patient was nine years old and their oldest sixty-two.

The acute form of the disease runs parallel in its manifestations to that of acute appendicitis, and is often indistinguishable from the latter. Typically, the disease is usually chronic in character and is characterized by loss of weight, progressive anemia, fever, attacks of diarrhea, and abdominal pain. Diarrhea is not as marked or severe as in cases of colitis, neither is there as much mucous or blood. Rectal tenesmus, perianal fistulas, and abscesses are absent. No case has been reported in which the disease involved the left colon or rectum.

As the disease progresses, there may be the usual signs and symptoms of obstruction due to stenosis of the involved bowel. Fistulous tracts also may be present. Many writers have called attention to the fact that an appendix scar is usually present.

In chronic stages of the disease, a mass is palpable at the site of the lesion, usually in the right iliac fossa. It is, of course, evident that the clinical signs and features of the disease will vary according to the stage and to the involvement of contiguous structures. It should be emphasized, however, that this disease is characterized by certain fundamental signs and symptoms, namely, progressive weakness and loss of weight, cramp-like pain in the lower abdomen or right iliac fossa, diarrhea with some blood and mucus in the stools, fever, a mass in the right iliac fossa, and oftentimes evidence of fistulous tracts.

Crohn in his original article directed attention to the fact that there were four stages in the clinical course:

1. Acute intra-abdominal disease with peritoneal irritation. It is impossible to differentiate this stage from that of acute appendicitis or certain other acute inflammatory diseases in this region. This is probably the reason why the appendix has been removed so frequently and the real condition overlooked. The clinical signs and symptoms are almost identical with those of acute appendicitis. The appendix usually shows evidence of disease, but this disease is due to the spreading of contiguous inflammation and not due to a primary disease of the organ itself. One could liken this to the involvement of the appendix in acute, right adnexal inflammatory conditions. The appendix is thickened, the serosa swollen and red. The experienced operator frequently recognizes that this is a secondary involvement and, not being satisfied with the appendix as the original cause of the disease, explores the adnexa and there finds the primary

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Fig 1 Serosal surface of pathological specimen from case reported

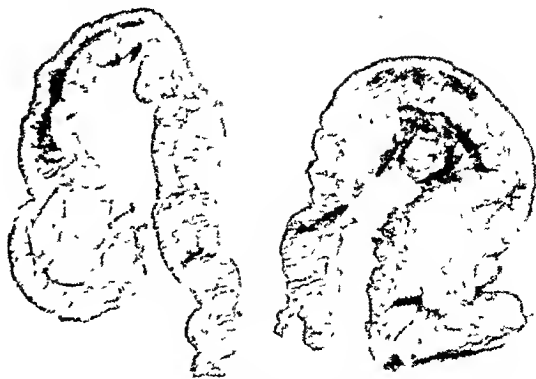


Fig 2 Cut sections of pathological specimen from case reported.

operation may be performed at one sitting, that is, an ileocolostomy and an extirpation of the diseased segment

Meyer and Rosi (65) state that a short-circuit operation without resection of the mass completely relieved the symptoms in about 50 per cent of the patients upon whom it was performed. They do not state the subsequent history of these patients, but they do go on to state that in their other cases in which this short-circuit operation alone was performed, the disease seemed to progress and required later resection. Holm (54) definitely showed, both operatively and clinically, that this side-tracking operation alone was a constant menace to the health of the patient. Berg (7), who has had a very wide experience, advocates resection with ileocolostomy as the operation of choice.

It is apparent, therefore, that the side-tracking operation alone is insufficient for a cure. Most surgeons have learned that operations requiring resection of the bowel should be carried out in multiple stages. This bitter lesson has been learned by trial and error, which has involved many failures and tragedies. Multiple operations of this type are parallel in their greater safety to the graded operations of radical prostatectomy. Many patients who present perilous conditions have been saved by this pattern of attack.

Pemberton (73) recently reported 39 cases of resection of the colon with only 2 deaths. Ileo-

colostomy was performed at the first stage. He also presented 43 cases of this preliminary operation with only 2 deaths. Mortality in skillful hands should not be high in spite of the early reports by some writers whose mortality reaches 36 per cent. Some surgeons have used the Mikulicz technique in their multiple stage operations instead of primary ileocolostomy. These procedures depend entirely upon the condition existing at the time of operation and the judgment and skill of the operator.

To epitomize then, medical treatment results in failure, although occasionally spontaneous cures may result. Short-circuit operations alone usually result in failure and are a menace to the patient who requires subsequent operations when he is less able to undergo them. Radical extirpation of the diseased portion in single or multiple stages is the treatment of choice.

REPORT OF A CASE

The author desires to report a case which has considerable human interest and also embraces all the typical and characteristic features of the disease. The human features refer to the errors in judgment on the part of the operator, not only once, but twice.

A young man, aged twenty-six, presented himself. His chief complaints were those of weakness, loss of weight, intermittent abdominal cramp-like pain, fever, and intermittent diarrhea with occasional blood and mucus in the stools. Examination revealed tenderness in the right iliac fossa and a suspicious mass. The leucocytes were about 15,000 and the polys 80 odd per cent. There was mild fever. A diagnosis was made of a possible appendiceal abscess.

source. This picture is quite typical and distinct from that of appendicitis when the disease originates within the appendix itself.

2 Symptoms of ulcerative enteritis

3 In the stenotic phase the symptoms are those of acute or subacute intestinal obstruction with inflammatory signs.

4 Persistent fistulas

These four stages have been so beautifully described by many writers that it seems superfluous to enlarge further upon their manifestations.

Following is presented an epitome of symptoms and percentages as reported by Jellen (58) in a review of 50 cases.

	Percent
Abdominal pain	72
Loss of weight	60
Palpable mass	58
Diarrhea	52
Anemia	42
Fever	38
Fistula	30
Vomiting	28

Attention of the reader is directed to the abstract on regional ileitis by Semansky, appearing in the University of Minnesota Hospitals (61). This splendid article embraces all the available knowledge and facts regarding the disease. A more beautiful word picture of this condition scarcely seems possible.

DIFFERENTIAL DIAGNOSIS

Inasmuch as the disease usually involves the right iliac fossa the differential diagnosis is narrowed to other lesions which may give signs and symptoms of a similar nature in this region. Probably the most important differentiation is that of non specific ulcerative colitis. One must remember that colitis generally can be diagnosed with the sigmoidoscope and the barium enema and from its clinical features. There are, however, other types which involve only the proximal colon. These instances are few and relatively uncommon and usually can be diagnosed with the barium enema. Other conditions are ileocecal and mesenteric tuberculosis, fibroplastic appendicitis or typhlitis, lymphosarcoma and Hodgkin's disease, actinomycosis and carcinoma. These conditions are mentioned without further comment since the scope of this paper does not embrace the discussion of the salient features of each condition.

X RAY FINDINGS

The value of the x ray in diagnosis is pertinent and should be emphasized. Kantor (61) states

that the barium enema usually gives reliable results except in those cases in which the cecum is involved, when there are evidences of deformity of this organ. There may also be an occasional case in which the barium enema regurgitates into the deformed stenotic ileum. The most constant and positive results are obtained with the barium meal. At examination the roentgen findings according to Kantor are as follows:

The first roentgen sign in regional ileitis affects the colon and ileum. The changes in the colon however unless the colon itself is involved are likely to be reflex in nature. Important changes found in the ileum are (1) a filling defect just proximal to the cecum, (2) abnormality in contour of the last filled loop of the ileum, (3) dilatation of ileac loops just proximal to the lesion, and (4) a string sign representing the actual lesion. The string sign, though characteristic is not pathognomonic of ileitis. It may be present in other stenosing processes in this region. When present, however the diagnosis of terminal ileitis must be given consideration. Weber has recently offered the term "twisted cord appearance."

To these findings, Jellen (58) adds the following: constant non visualization of the involved segment in some cases and deformity of the cecum. Shierlin's sign is almost always present in the combined form of ileitis and colitis. Because of the similarity of gross pathology of the lesion and ileocecal tuberculosis this sign is present in both conditions.

TREATMENT

Meyer (65) and others state that occasionally the condition may resolve and a spontaneous cure result. Medical treatment is of little or no avail. Felsen (31) seems to be the only author whose work has been reviewed who disagrees with this statement. He says that surgical treatment is unsatisfactory and that there is a high incidence of recurrence. The ideal therapy according to him is based upon the prevention of bacillary dysentery. With this exception there is a unanimous agreement that the treatment of regional ileitis is surgical and demands for its cure a wide resection of diseased parts. Recurrences after surgery are due according to Crohn and Rosenak (24) to the leaving of infected areas. There are skip areas of ileitis in ileitis and areas of healthy tissue between islands of diseased tissue.

The surgical treatment must be governed by the progress of the disease and the condition of the patient but all surgical treatment is directed toward the extirpation of the diseased portion. If the condition of the patient is satisfactory, the

Following is a bibliography extending from 1932 through September, 1937. It includes all the references in the indices under the heading of inflammatory lesions of the ileum, non-specific granulomas and terminal and regional ileitis. Two splendid additional reviews by Jackson and Pemberton, subsequent to this, are included. Other articles previous to 1932 have also been included. These are those of Braun, Tietze, Moschcowitz, Wilensky and Mock (1909, 1920, 1923, 1931). There is also appended a list of reported cases. These number 445, and, together with the author's case, make a total number of 446.

The author desires to give credit to other writers for material quoted, whether specified or not, and to Miss Marguerite Prime and the Department of Literary Research of the American College of Surgeons, for the preparation of the bibliography and list of reported cases.

REPORTED CASES OF REGIONAL ENTERITIS

Year	Reported by	No. of cases
1932	Crohn, B. B., Ginzburg, L., and Oppenheimer, G. D.	14*
	Friedenwald (See Crohn et al. discussion)	2
	Golob, M.	1
	Hirschman (See Crohn et al. discussion)	1
1933	Clute, H. M.	2
	Clute, H. M. (See Homans and Hass discussion)	2
	Eggers, C. (See Gordon discussion)	2
	Erdmann, J. F., and Burt, C. V.	5
	Fischer, A. W., and Luermann	3
	Gordon, D.	1
	Hanford, J. M. (See Gordon discussion)	1
	Harris, F. I., Bell, H. G., and Brunn, H.	3
	Homans, J., and Hass, G. M.	2
	Jannsen, C. L. (See Gordon discussion)	1
	Konjetzny (See Fischer, A. W., and Luermann discussion)	2
	Molesworth, H. W. L.	1
	Peterson, E. W. (See Gordon discussion)	1
	Plenk (See Fischer, A. W., and Luermann discussion)	1
	Rockey, E. W.	4
	Simon, L. (See Fischer, A. W., and Luermann)	1
1934	Anschutz, G.	12
	Bell, H. G.	1
	Bissell, A. D.	2
	Breyer, J. H. (See Bell discussion)	1
	Brown, P. W., Bergen, J. A., and Weber, H. M. (See Pemberton and Brown, 1937)	18*
	Colp, R.	1
	Corr, P., and Boeck, W. C.	1
	Crohn, B. B. (See later report)	30 to 40*
	Culbertson, C.	1
	Cushway, B. C.	2
	DeCourcy, J. L.	1
	Donchess, J. C., and Warren, S.	1
	Finney, C. M.	1
	Goldfarb, S. L.	2
	Haberer, H. von	3
	Holman (See Bell discussion)	1
	Jackman, W. A.	2
	Kantor, J. L.	6
	Kapel, O.	2
	Ladd (See Kantor discussion)	2
	Peters, O.	3
	Phillips, K. T.	1
	Roepke, W.	1
	Schapiro, I. S.	1
	Smith, R. (See Bell discussion)	1
	Stout, F., Hoagensen, and Smith	1
	Williams, C.	1
1935	Arnheim, E. E.	1
	Bergen, J. A., and Coffey, R. J.	4*
	Bergen, J. A., and Dixon, C. F.	2*
	Binney, H.	2
	Bockus, H. L., and Lee, W. E.	1
	Brunn, H. (See Mixter discussion)	3
	Cabot	1
	Deelman, H. T.	4
	Delannoy, E.	2
	Erb, I. H., and Farmer, A. W.	4
	Erdmann, J. F., and Burt, C. V.	5
	Gagliardi, P.	1
	Galambos, A., and Mittelmann, W.	2
	Goetsch, E. (See Mixter discussion)	1
	Groen, J., and Pompen, A. W. M.	6
	Jones, T. E., and Byrne, R. V.	4
	Lee, W. E. (See Mixter discussion)	1
	Mixter, C. G.	11
	Semansky, L. J.	1
	Shramek, J. M., and Russum, B. C.	4
	Straaten, T.	3
1936	Barbour, R. F., and Stokes, A. B.	1
	Cabot	1
	Connell, F. G.	3
	Corriden, T. F.	1
	Crohn, B. B.	68
	Crohn, B. B., and Rosenak, B. D.	60*
	Downing, W. L., and Allen, C. V.	1
	Ielsen, J.	51*
	Fenster, E.	4
	Friedl-Meyer, M.	1
	Gisbertz, H.	3
	Kate, J. ten	2
	Knapper, C.	2
	Koster, H., Kasman, L. P., and Sheinfeld, W.	17
	Meyer, K. A., and Rosi, P. A.	8
	Mulsow, F. W.	1
	Musick, V. H.	1
	Powers, J. H.	3
	Probststein, J. G., and Gruenfeld, G. E.	3
	Reichert, F. L., and Mathes, M. E.	2
	(Also Holman *)	
	Rosenblate, A. J., Goldsmith, A. A., and Strauss, A. A.	1
	Ross, K.	1
	Sanders, C. B.	5
	Schwabacher, H.	1
	Snapper, I., Pompen, A. W. M., and Groen, J.	6
	Sproull, J.	1
	Taylor, J. L.	2
1937	Adams, H. D.	15
	Bisgard, J. D., and Henske, J. A.	1
	Colbeck, J. C., Hurst, A. F., and Lintott, G. A. M.	2
	Forbes, R. D., and Duncan, J.	5
	Goldsmith, R. (See Ravdin and Rhoads discussion)	1
	Halligan, E. J., and Halligan, H. J.	1
	Hodgson, J. C.	1



Fig 3 Regional ileitis (B S Putts and Ralph Bacon roentgenologists)



Fig 4 Regional ileitis (B S Putts and Ralph Bacon roentgenologists)

Operation was performed through a right rectus incision. The ileum was found to be enlarged, edematous thickened, heavy, purplish in color, and semi flexible like the body of a snake for a distance of 12 in. The disease ended abruptly at the ileocecal valve and tapered off gradually at the proximal end. The appendix itself presented almost the same appearance. The tip was attached at the ileum about 3 in from the ileocecal valve. This condition was new and confusing to the operator although he stated to the intern that in the back of his mind there was a mental picture of a condition described by somebody previously. The appendix was removed. The tip had become canalized to the ileum itself. Because this was so it was an easy step of false logic to believe that somehow this canalizing of the appendix had caused the disease in the ileum. The appendix was removed and one more scar was added to the list of almost pathognomonic signs of terminal ileitis. Strangely enough following the operation the condition of the patient improved. He gained weight the pain subsided and his other symptoms were in abeyance. A few weeks later he returned complaining of a recurrence of all the symptoms. At this time an x ray study was instituted and the typical findings of terminal ileitis with stenosis were found.

Failure of human judgment occurred again for in response to a request to wait until after the holidays for his operation, the writer acquiesced. Within twenty four hours, an acute abdominal catastrophe was manifested by all the signs and symptoms of a perforation. Operation was hastily performed. The cecum at this time was involved. In spite of the fact that perforation of the ileum was present with local peritonitis a radical resection of the terminal ileum and cecum was performed. The two ends of the bowels were brought out of the wound according to the Mikulicz technique. The convalescence was stormy but because of the inherent resistance of the patient and providential favor recovery resulted. Later a repair was made of the open ends of the bowel. This dramatic incident happened two years ago. The patient is alive and well.

Appended are pictures of the pathological specimens made after the latter had stood in hardening solution for two years. There are also the x ray pictures. These seem to portray an accurate example of regional ileitis. Microscopic sections were made by H H Bullard, pathologist of St Vincent's Hospital, whose diagnosis was terminal ileitis. He noted a few giant cells in some of the sections.

Following is a bibliography extending from 1932 through September, 1937. It includes all the references in the indices under the heading of inflammatory lesions of the ileum, non-specific granulomas and terminal and regional ileitis. Two splendid additional reviews by Jackson and Pemberton, subsequent to this, are included. Other articles previous to 1932 have also been included. These are those of Braun, Tietze, Moschcowitz, Wilensky and Mock (1909, 1920, 1923, 1931). There is also appended a list of reported cases. These number 445, and, together with the author's case, make a total number of 446.

The author desires to give credit to other writers for material quoted, whether specified or not, and to Miss Márguerite Prime and the Department of Literary Research of the American College of Surgeons, for the preparation of the bibliography and list of reported cases.

REPORTED CASES OF REGIONAL ENTERITIS

Year	Reported by	No. of cases
1932	Crohn, B. B., Ginzburg, L., and Oppenheimer, G. D.	14*
	Friedenwald (See Crohn et al. discussion)	2
	Golob, M.	1
	Hirschman (See Crohn et al. discussion)	1
1933	Clute, H. M.	2
	Clute, H. M. (See Homans and Hass discussion)	2
	Eggers, C. (See Gordon discussion)	2
	Erdmann, J. F., and Burt, C. V.	5
	Fischer, A. W., and Luermann	3
	Gordon, D.	1
	Hanford, J. M. (See Gordon discussion)	1
	Harris, F. I., Bell, H. G., and Brunn, H.	3
	Homans, J., and Hass, G. M.	2
	Jannsen, C. L. (See Gordon discussion)	1
	Konjetzny (See Fischer, A. W., and Luermann discussion)	2
	Molesworth, H. W. L.	1
	Peterson, E. W. (See Gordon discussion)	1
	Plenk (See Fischer, A. W., and Luermann discussion)	1
	Rockey, E. W.	4
	Simon, L. (See Fischer, A. W., and Luermann)	1
1934	Anschutz, G.	12
	Bell, H. G.	1
	Bissell, A. D.	2
	Breyer, J. H. (See Bell discussion)	1
	Brown, P. W., Bergen, J. A., and Weber, H. M. (See Pemberton and Brown, 1937)	18*
	Colp, R.	1
	Corr, P., and Boeck, W. C.	1
	Crohn, B. B. (See later report)	30 to 40*
	Culbertson, C.	1
	Cushway, B. C.	2
	DeCourcy, J. L.	1
	Donchess, J. C., and Warren, S.	1
	Finney, C. M.	1
	Goldfarb, S. L.	2
	Haberer, H. von	3
	Holman (See Bell discussion)	1
	Jackman, W. A.	2
	Kantor, J. L.	6
	Kapel, O.	2
	Ladd (See Kantor discussion)	2
	Peters, O.	3
	Phillips, K. T.	1
	Roepeke, W.	1
	Schapiro, I. S.	1
	Smith, R. (See Bell discussion)	1
	Stout, F., Hoagensen, and Smith	1
	Williams, C.	1
1935	Arnheim, E. E.	1*
	Bergen, J. A., and Coffey, R. J.	4*
	Bergen, J. A., and Dixon, C. F.	2*
	Binney, H.	2
	Bockus, H. L., and Lee, W. E.	1
	Brunn, H. (See Mixer discussion)	3
	Cabot	1
	Deelman, H. T.	4
	Delannoy, E.	2
	Erb, I. H., and Farmer, A. W.	4
	Erdmann, J. F., and Burt, C. V.	5
	Gagliardi, P.	1
	Galambos, A., and Mittelman, W.	2
	Goetsch, E. (See Mixer discussion)	1
	Groen, J., and Pompen, A. W. M.	6
	Jones, T. E., and Byrne, R. V.	4
	Lee, W. E. (See Mixer discussion)	1
	Mixer, C. G.	11
	Semansky, E. J.	1
	Shramek, J. M., and Russum, B. C.	4
	Straaten, T.	3
1936	Barbour, R. F., and Stokes, A. B.	1
	Cabot	1
	Connell, F. G.	3
	Corriden, T. F.	1
	Crohn, B. B.	68
	Crohn, B. B., and Rosenak, B. D.	60*
	Downing, W. L., and Allen, C. V.	1
	Felsen, J.	51**
	Fenster, E.	4
	Friedl-Meyer, M.	1
	Gisbertz, H.	3
	Kate, J. ten	2
	Knapper, C.	2
	Koster, H., Kasman, L. P., and Sheinfeld, W.	17
	Meyer, K. A., and Rosi, P. A.	8
	Mulson, F. W.	1
	Musick, V. H.	1
	Powers, J. H.	3
	Probst, J. G., and Gruenfeld, G. E.	3
	Reichert, F. L., and Mathes, M. E.	2
	(Also Holman *1)	
	Rosenblatt, A. J., Goldsmith, A. A., and Strauss, A. A.	1
	Ross, K.	1
	Sanders, C. B.	5
	Schwabacher, H.	1
	Snapper, I., Pompen, A. W. M., and Groen, J.	6
	Sproull, J.	1
	Taylor, J. L.	2
1937	Adams, H. D.	15
	Bisgard, J. D., and Henske, J. A.	1
	Colbeck, J. C., Hurst, A. F., and Lintott, G. A. M.	2
	Forbes, R. D., and Duncan, J.	5
	Goldsmith, R. (See Ravdin and Rhoads discussion)	1
	Halligan, E. J., and Halligan, H. J.	1
	Hodgson, J. C.	1

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Jackson A S	4	64 535	
(Western Surgical Society Members)	64	27	DeCOURCY J L J Med Cincinnati Ohio 1934
Jellen J (Mt Sinai)	0	55 216	
Johnston R C	2	28	DELLMAN H T Nederl Tijdschr v Geneesk 1935
Kalkas H U	1	79 3047	
Jinsela V J	1	29	DELANNOY E Echo méd du nord 1935 4 447
Knapper C	2	30	DEVERA M Prog de la clin 1934 42 462
Kropfeld S M	3	31	DOVCHESS J C and WARREN S Arch Path 1934
Landois F	1	18 22	
Larimore J W	2	32	DOWNING W L and ALLEN C V J Iowa State M
Leonardo K A	1	Soc 1936 26 206	
Merke T	3	33	EEN I H and FARNER A W Surg Gynec &
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Pemberton J J and Brown P W	39	34	FELSEN, J Am J Digest Dis & Nutrition 1935 1
Pemberton J J and Whittaker I D		782	
Ravdin I S and Rhoads J E	6	35	Idem New York State J M 1935 35 576
Ryan T J	1	36	Idem Ann Int Med 1936 10 645
Shearer J P and Jackson J T	1	37	FELSEN J and GORENBERG H Am J M Sc 1936
Storey W E	1	192 555	
Veltman A	1	38	FENSTER E Beitr z klin Chir 1936 164 461
Vokoun F J (including case of Tancik)	2	39	FETTERMAN G H and LEENER H J Lab & Clin
Lick M	1	Med 1936 21 1157	
Total number of cases	446	40	FISCHER and LUERMANN Arch f klin Chir 1935

*Cases have been included in other reports listed herein

*If we add Felsen's 31 cases the total becomes 497

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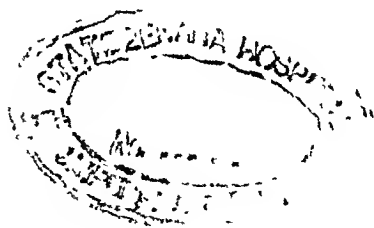
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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Nuttall H C W Rectus Transplantation for Midline Incisional Hernias *Brit J Surg* 1937 25 344

It is a common experience that a lasting cure of incisional hernia is difficult to obtain. Because of frequent recurrences following operations a considerable number of modified operative procedures have been advocated by various surgeons. Nuttall remarks that it is difficult to know which to admire most the ingenuity of the surgeons or the fortitude of the patients. Many so-called radical cures have not been based on sound surgical or anatomical principles.

The author has devised a method of surgical repair for large primary or recurrent midline incisional hernias which has given excellent results in several cases. It consists essentially in detaching the abdominal rectus muscles from their insertion at the symphysis pubis, freeing the muscles from the rectus sheaths and again attaching them in an overlapping manner to the fibrous tissues at the symphysis pubis.

THE OPERATION

With the patient on the table in the Trendelenberg position a vertical incision is made and the skin and fat are dissected on both sides sufficiently to expose the lower halves of the recti and their sheaths. Any adherent peritoneum must be separated from the skin and the sac must be freed. Adherent omentum or bowel is freed and dropped back into the abdomen and the hernial sac is closed by suture. Next the rectus sheath is carefully reflected from the muscle on both sides well down onto the pubis.

Each rectus muscle is now detached from the attachment to the symphysis pubis without interfering with its nerve supply in any manner. Both of the rectus muscles are now stretched downward to the opposite side and firmly sutured to the ligaments and fibrous tissue at the pubis. If necessary the muscles can be shortened by turning up the lower inch or so and suturing it in place. A series of additional sutures are next inserted along the edges to maintain apposition of the overlapped muscles. The rectus sheaths on either side are then brought together as well as possible; some deficiency does not impair the final result. Finally the skin incision is sutured and a rubber dam drain is inserted. Abdominal exercises are regarded as important by the writer and are begun from ten days to two weeks post-operatively. At first the patient tenses the abdominal muscles by raising his head; gradually the effort is increased and finally he attempts to sit up with the arms raised with no aid from the elbows. Later the extended legs are raised on the abdomen. The patient is advised not to wear a belt.

CASE REPORTS

The first case was that of a widow of sixty-eight years. She had undergone three operations elsewhere in 1917 a midline subumbilical incision for uterine prolapse and in 1922 and 1927 for incisional hernia. On admission her general condition was good. A very large incisional hernia overhung the vulva; it was irreducible. Then was an orifice in the abdominal wall just above the pubis which admitted four fingers. Operation was performed on April 30, 1927. The rectus muscles were transplanted. On July 10, 1937 the wound was well healed; the muscles were firm and there was no sign of hernia.



Fig 1 Recti detached from pubis. A Fold of Douglas. B Transversalis fascia and peritoneum. C Upper edge of symphysis pubis.



Fig 2 Right rectus sutured to opposite side of pubis. A Upper edge of symphysis pubis.



Fig 3 Left rectus overlapping right and sutured to opposite side of pubis.

The second patient was a woman forty years of age. Cesarean section in 1930 had been followed by a midline incisional hernia. Examination revealed a fairly large hernia above the pubis, bilobulated and irreducible. Transplantation of the lower ends of the rectus muscles was done on April 30, 1937. The upper portion of the rectus sheath was deficient and could not be approximated. On July 8, 1937, the wound was found to be healed, the muscles showed firm contraction, and there were no signs of hernia.

DISCUSSION

In selecting patients for this type of operation, the hernial orifice must be at or near the midline, usually just above the pubis. The tone of the muscles should be good. Diastasis of the rectus muscles is no contra-indication for the operation. Two of the patients operated upon by the writer had been previously regarded as hopelessly inoperable. The idea of utilizing living active muscle in the repair of abdominal hernias is not new. There is agreement on the principles of muscle transplantation on at least five points: the nerve supply must be preserved intact, the line of action from origin to insertion must be as straight as possible, the muscles should be sutured in moderate tension, muscles should be transplanted into bone if possible, and there must be no lateral pull on the belly of the muscle.

The question of what happens on the outer side of the rectus muscle when it is detached and brought across the midline may be answered by the fact that no lateral hernia develops because the sheath of the muscle remains intact on both sides and retains its connection with the flat muscles. After the muscles have been sutured in position, the sheath is drawn over the muscle again, which pulls the flat abdominal muscles toward the midline and effectively guards the areas to the outer side of the rectus muscles. It is remarkable how solid the lower abdominal wall feels when the muscles are contracted.

JOHN W. NUZZI, M.D.

GASTRO-INTESTINAL TRACT

Tangari, C.: *Linitis Plastica and Hypergenesis of Connective Tissue in Fibrous Carcinomas of the Stomach* (*Linitis plastica ed ipergenesì connettivale nei canceri fibrosi dello stomaco*). *Clin chir*, 1937, 13: 579.

On the basis of extensive histological studies, Tangari found that in the general evolution of a carcinomatous process the original histological picture of the tumor undergoes a series of modifications which depend partly upon the local reaction of the stroma, and partly upon a sclerogenous diathesis of the individual which, in turn, depends upon endocrine factors. Examples of such histological modifications are found in scirrhus carcinomas of the breast and in linitis plastica, which represents classically the sclerotic evolution of a primarily carcinomatous process.

Histologically, linitis plastica is characterized by a more or less diffuse thickening of the gastric wall with its mucosa remaining intact. In other cases the lesion involves also the intestinal tract and gives rise to metastases in the mesenteric lymph glands, and sometimes it involves also the peritoneal serosa.

In order to interpret the histogenetic process of this fibrous hypergenesis correctly, the author studied histologically all the localizations of linitis plastica and compared them with the common forms of scirrhus carcinoma of the stomach and with other forms of epithelial tumors involving the gastric mucosa.

In ordinary cases of linitis plastica the carcinomatous process begins in the depths of the glandular tubules. The most superficial layer is not attacked and therefore the mucosa appears to remain intact for a shorter or longer period of time. There follows a rapid and general invasion of the entire gastric wall while an intense proliferation of fibrous tissue occurs around the individual neoplastic elements which are disseminated in the various layers. Dissemination occurs mainly by way of the lymphatics and the proliferation of the connective tissue has therefore a perilymphatic distribution.

At first the various layers may be identified, but as the process continues, the tissue assumes an altered and uniform or homogeneous aspect. This is shown microscopically by a dense fibrous mass containing here and there small epithelial nests distributed essentially endolymphatically.

In this general fibrous metamorphosis, the tunica muscularis deserves special attention in that the fibrocellular elements are, as the result of involutive modifications, finally confused morphologically with common fibroblasts, which may participate in the general fibrotic reaction.

The blood vessels of the invaded area also do not escape the general process. Microscopically they present hyaline changes, hyperplasia of the intima, and proliferation of the endothelial elements. The adenoid tissue of the regional and mesenteric lymph glands is replaced by a sclerotic stroma in which there are a few irregularly disseminated epithelial islands.

In the peritoneal serosa, the subserosa is greatly thickened. Microscopically it is seen to be sclerotic, callous, retroperitonitis, and it contains small epithelial islands.

Tangari thus concludes that in general, microscopically as well as grossly anatomically, linitis plastica is analogous to the common forms of scirrhus carcinoma of the stomach, as well as with the entire group of specific inflammatory lesions involving the gastric wall. It is necessary, therefore, to differentiate linitis plastica of carcinomatous origin from all diffuse sclerotic conditions of the stomach due to inflammatory changes and specific infections. This differentiation is not always easy in view of the forementioned anatomicopathological resemblances.

RICHARD C. SOMMA, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Nuttall H C W Rectus Transplantation for Midline Incisional Hernias *Brit J Surg* 1937 25 344

It is a common experience that a lasting cure of incisional hernia is difficult to obtain. Because of frequent recurrences following operations a considerable number of modified operative procedures have been advocated by various surgeons. Nuttall remarks that it is difficult to know which to admire most the ingenuity of the surgeons or the fortitude of the patients. Many so called radical cures have not been based on sound surgical or anatomical principles.

The author has devised a method of surgical repair for large primary or recurrent midline incisional hernias which has given excellent results in several cases. It consists essentially in detaching the abdominal rectus muscles from their insertion at the symphysis pubis freeing the muscles from the rectus sheath and again attaching them in an overlapping manner to the fibrous tissues at the symphysis pubis.

THE OPERATION

With the patient on the table in the Trendelenberg position a vertical incision is made and the skin and fat are dissected on both sides sufficiently to expose the lower halves of the recti and their sheaths. Any adherent peritoneum must be separated from the skin and the sac must be freed. Adherent omentum or bowel is freed and dropped back into the abdomen and the hernial sac is closed by suture. Next the rectus sheath is carefully reflected from the muscle on both sides well down onto the pubis.

Each rectus muscle is now detached from the attachment to the symphysis pubis without interfering with its nerve supply in any manner. Both of the rectus muscles are now stretched downward to the opposite side and firmly sutured to the ligaments and fibrous tissue at the pubis. If necessary the muscles can be shortened by turning up the lower inch or so and suturing it in place. A series of additional sutures are next inserted along the edges to maintain apposition of the overlapped muscles. The rectus sheaths on either side are then brought together as well as possible some deficiency does not impair the final result. Finally the skin incision is sutured and a rubber dam drain is inserted. Abdominal exercises are regarded as important by the writer and are begun from ten days to two weeks postoperatively. At first the patient tenses the abdominal muscles by raising his head gradually the effort is increased and finally he attempts to sit up with the arms raised with no aid from the elbows. Later the extended legs are raised on the abdomen. The patient is advised not to wear a belt.

CASE REPORTS

The first case was that of a widow of sixty eight years. She had undergone three operations elsewhere in 1917 a midline subumbilical incision for uterine prolapse and in 1922 and 1927 for incisional hernia. On admission her general condition was good. A very large incisional hernia protruding the vulva it was irreducible. Then was an orifice in the abdominal wall just above the pubis which admitted four fingers. Operation was performed on April 30 1937. The rectus muscles were transplanted. On July 10 1937 the wound was well healed the muscles were firm, and there was no sign of hernia.

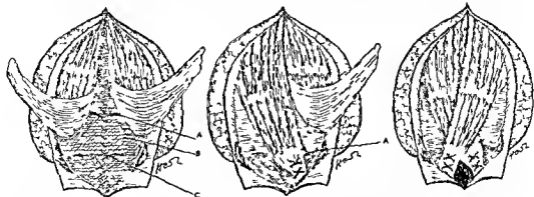


Fig 1 Recti detached from pubis A Fold of Douglas, P Transversalis fascia and peritoneum C Upper edge of symphysis pubis

Fig 2 Right rectus sutured to opposite side of pubis
A Upper edge of symphysis pubis

Fig 3 Left rectus overlying right and sutured to opposite side of pubis

in direct ratio to the degree that gastric function is modified, particularly in its secretory mechanism. At the same time, the ideal to be sought for would appear to be to modify gastric function only sufficiently to cure the ulcer and to prevent the recurrence of the disease.

Partial gastrectomy and posterior gastro-enterostomy are the most effective procedures in the treatment of duodenal ulcer.

The second general principle of surgical management for duodenal ulcer involves operations on the outlet of the stomach in an endeavor to modify gastric function by permanent ablation of the pylorus.

The first indication for operation in gastric ulcer is that, regardless of the history which the patient may present, if the lesion which is demonstrated roentgenologically does not heal satisfactorily in a reasonable length of time by medical treatment, the surgeon is not fulfilling his responsibility unless he advises the patient to have the lesion removed. The chief advantage is that the small gastric ulcer can be removed satisfactorily by either knife or cautery, the defect closed, and gastro-enterostomy performed with every assurance of an excellent and permanent result. This type of operation, namely, excision and gastro-enterostomy, is an ideal procedure for the small gastric ulcer.

When ulcers are situated in the upper segment of the stomach, operation perhaps should not be advised so readily, and more intensive and prolonged medical treatment may be justified. The lesions in the upper part of the lesser curvature, however, usually can be dealt with directly by local excision after the lesser curvature has been mobilized by the division of inflammatory adhesions which are routinely found in such cases. When partial gastrectomy can be done with little more risk than excision and gastro-enterostomy, it can never be condemned for gastric ulcer. It is important to remember that gastro-enterostomy alone for gastric ulcer has proved in many cases to enhance the capacity of healing the lesion, provided of course it is not malignant.

The indications for operation in cases of benign tumor are clear when they have been demonstrated roentgenologically. When a tumor which has been responsible for bleeding is visualized roentgenologically, the indication for removal is clear since the operation can usually be done satisfactorily without more than incidental risk. The chief indication at operation in such cases is to be aware of the fact that these tumors may be multiple even though only a single lesion has been demonstrated by the roentgen rays.

Diverticulum of the duodenum is not of great surgical importance because of the rarity with which operation is indicated in such cases. It is only when such diverticula are of great size, or in very rare instances in which complications have occurred, that any surgical procedure should be seriously considered.

In this country very little interest has been shown in the proposal of gastric resection for gastritis. From a surgical standpoint, gastritis is more a prob-

lem of academic interest, that is, the relation of gastritis to ulcer and gastric cancer, and its place as a factor in disappointing results after operation. The general impression among clinicians at the moment is that the condition is one which usually can be remedied easily by suitable medical management, and there is an increasing possibility of diagnosing the condition both by its clinical manifestations and by means of the gastroscope and fluoroscope.

Indications for operation in cases of cancer of the stomach depend on many factors, and first, on whether or not a positive diagnosis can be made. The profession is well aware of the danger of dealing with a small cancer of the stomach on the assumption that it is a gastric ulcer, but the very fact that this is now well known has greatly decreased the number of such cases.

The frequency with which cancer, as we see it, develops in gastric ulcer must be comparatively small because of the high incidence of cancer of the stomach and the relative rarity of gastric ulcer. The question of advising operation for a small gastric lesion which has all the appearance of being an ulcer on the score that it may be malignant, will have to be determined chiefly by the degree of distress that the patient is having from the ulcer, the amount and kind of treatment he has had for it, whether or not by roentgen examination there are signs of healing, and the risk of a surgical procedure. Unless symptoms are quite uncontrollable by medical treatment, and unless unquestionably adequate treatment has been applied, these small gastric lesions should be under the observation of a physician who can and will institute intensive medical management, who will be conscious of the possibility of the lesion actually being malignant, and who will, therefore, keep the patient under close observation from a clinical and roentgenological standpoint.

Another group of cases in which there is some uncertainty on the score of diagnosis are those in which symptoms may arouse suspicion that malignant disease is present, but in which the latter fact cannot be confirmed roentgenologically. In the records of the clinic from 1906 to 1931 only 25 patients were sent to the hospital for operation because of a clinical diagnosis of cancer of the stomach when the roentgenologist reported a negative stomach. No better evidence of how the expert roentgenologist can convince the surgeon of the accuracy of his method can be found than this.

In addition to this group are cases in which patients were operated on for other abdominal conditions, and in which cancer of the stomach was encountered although the roentgenologist's study of the stomach had been negative. A further debatable group, insofar as uncertainty of diagnosis is concerned, consists of those cases in which spasm either of the antrum or pylorus appeared to represent an organic lesion and in which a diagnosis of cancer of the stomach was made but could not be confirmed by the consulting roentgenologist. Finally, there is

Cardillo F Sarcoma of the Stomach (*Bul sarcoma de'lo stomaco*) *Radiol med* 1937 24 723

Cardillo briefly reviews the clinical and anatomic pathological pictures of sarcoma of the stomach. He reports 4 cases which came under his personal observation. The youngest patient was twenty-eight years of age and the oldest was fifty-eight. In 3 cases the sarcoma was primary in the stomach. Two of these cases were round cell sarcomas and one was a lymphosarcoma. The fourth case was a metastatic sarcoma with polymorphous cells the site of the primary tumor being unknown. All 4 cases were controlled histologically. In 3 cases the correct diagnosis was made on the live patient. In the case with the metastatic lesions the diagnosis of sarcoma of the stomach presented no difficulties because there had been other manifestations of the disease before it was diagnosed with x rays.

The lymphosarcoma was diagnosed roentgenologically.

In 3 of the cases the condition was at first confused with an atypical carcinoma and in the other case the presence of a diffuse vegetating mass led the author to suspect a sarcomatous lesion. On the basis of these experiences the author discusses the possibility of diagnosing sarcomas of the stomach with the aid of roentgenology.

The author states that although there do not exist well defined roentgenological criteria for the differentiation of sarcoma from malignant epithelial tumors of the stomach several attempts have been made to make this differentiation possible. The roentgenological differential diagnosis is somewhat easier in neoplasms with endogastric or exogastric development in the presence of a vegetating mass.

In the roentgen picture neoplastic forms with endogastric development produce defects with well delimited and rounded borders. The contour of the wall however is not altered and the peristalsis is not disturbed. In carcinomas on the other hand the picture shows multiple defects with indistinct contours. Peristalsis is abolished and the gastric wall is rigid.

Sarcomas which develop within the lumen of the stomach cannot be differentiated roentgenologically from benign tumors.

Concerning those neoplastic forms which develop exogastrically and which are usually characterized by voluminous pedunculated or sessile masses implanted on the wall of the stomach the difficulty consists in differentiating them from certain tumors which arise independently from the stomach but which on account of being in its vicinity have become adherent to it. This may give rise to deformations of the stomach and to the appearance of configurations suggestive of diverticula. These alterations may become so pronounced as to impair peristalsis even in the absence of any intrinsic changes of the gastric wall.

Often x rays will not aid diagnosis especially in the presence of infiltrating sarcomas. These tumors are easily confused with common carcinomas.

The author concludes by stating that the essential points to be remembered in the roentgenological diagnosis of sarcoma of the stomach are (1) peristalsis may or may not be present, (2) the stomach wall is usually rigid, (3) sarcoma usually spares the gastric orifices so that a pyloric stenosis for example is never produced although a pyloric incontinence usually develops, (4) an atypical picture of carcinoma is always strongly suggestive of the presence of a sarcoma.

Richard E. Souma, M.D.

Balfour D. C. Indications for Operation in Cases of Gastric Disease *Surg Clin North Am* 1937, 17 947

The common indications for operations in chronic duodenal ulcer aside from those complications which may of themselves clearly call for operation are chronicity and sufficient severity of symptoms which cannot be controlled by adequate medical treatment. In addition the age, sex, occupation, and disposition of the patient must be taken into consideration because all these factors influence the result of any form of treatment.

There are certain general principles in the management of duodenal ulcer which have become well established. Since it is not a malignant disease and since the serious complications are relatively rare emergency measures are required only in the event of acute perforation. In a large percentage of cases of duodenal ulcer the disease may be controlled by adequate medical management.

The fundamentals of treatment have not materially changed. Frequent feedings of an adequate amount of food have been shown to be very important and Maon has demonstrated in dogs that feeding at frequent intervals is a major factor in controlling gastric acidity. More recent developments in medical management have been the use of such buffer agents as mucin, and the use of extracts of duodenal mucosa. The latter has been shown experimentally to have an inhibitory action on gastric secretion. The early reports of the results of any treatment of duodenal ulcer must take into consideration the prompt relief of symptoms which usually comes only from rest.

Surgical treatment of duodenal ulcer in its early stages may be indicated in those cases in which symptoms are severe and do not respond to treatment or the patient is unwilling or unable to persist in a satisfactory regimen. In such cases (because the patient is young there is usually no motor impairment and gastric secretion is hyperactive) gastroenterostomy should be avoided for the incidence of jejunal ulceration is high in such circumstances.

The results of the surgical management of duodenal ulcer will depend to a large extent on the skill with which cases are selected for operation.

The general principles of management are secondary in importance to the selection of patients for operation for duodenal ulcer. All surgical procedures have a common purpose that is to modify gastric function and apparently the results of operation are

in direct ratio to the degree that gastric function is modified, particularly in its secretory mechanism. At the same time, the ideal to be sought for would appear to be to modify gastric function only sufficiently to cure the ulcer and to prevent the recurrence of the disease.

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Indications for operation in cases of cancer of the stomach depend on many factors, and first, on whether or not a positive diagnosis can be made. The profession is well aware of the danger of dealing with a small cancer of the stomach on the assumption that it is a gastric ulcer, but the very fact that this is now well known has greatly decreased the number of such cases.

The frequency with which cancer, as we see it, develops in gastric ulcer must be comparatively small because of the high incidence of cancer of the stomach and the relative rarity of gastric ulcer. The question of advising operation for a small gastric lesion which has all the appearance of being an ulcer on the score that it may be malignant, will have to be determined chiefly by the degree of distress that the patient is having from the ulcer, the amount and kind of treatment he has had for it, whether or not by roentgen examination there are signs of healing, and the risk of a surgical procedure. Unless symptoms are quite uncontrollable by medical treatment, and unless unquestionably adequate treatment has been applied, these small gastric lesions should be under the observation of a physician who can and will institute intensive medical management, who will be conscious of the possibility of the lesion actually being malignant, and who will, therefore, keep the patient under close observation from a clinical and roentgenological standpoint.

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the group of cases in which the expert roentgenologist finds sufficient rigidity of the musculature of the stomach along with superficial ulceration to justify the statement that malignancy cannot be ruled out. Such patients should be kept under the closest observation and be repeatedly examined roentgenologically and if the deformity persists exploration should be advised. In the much larger group the diagnosis of cancer is all too clear, and the question to be decided is whether or not exploration is justifiable.

Among contra-indicating factors is a diagnosis by the roentgenologist of a frankly inoperable cancer. The surgeon will have in mind the fact, however, that the nature of the cancer even though it seemed to the roentgenologist to involve too great an area of the stomach, may make possible an extensive resection with some possibility for cure or a great probability of real palliation. The investigation for evidence of metastasis should be most thorough as the end results of operation for cancer of the stomach depend to a considerable extent on whether or not metastasis has been meticulously searched for prior to operation. The rectal shelf, the supraclavicular notch and the occasional thoracic metastatic lesion may easily be overlooked in an incomplete examination.

Having eliminated the possibility of distant metastasis, examination of the tumor when it is palpable will disclose findings of importance. Its size is of importance since the significance of a large mass may be much exaggerated; some of the most favorable cases for cure are those of large colloid and well demarcated tumors. A much more important sign than size is the mobility of a tumor, particularly its lateral mobility. Severe pain is of serious import since it usually denotes involvement of the peritoneum. Rapid loss of weight in the absence of obstruction of either cardia or pylorus and any suggestion of icteric sclerae are not encouraging features. Marked secondary anemia in the absence of gross hemorrhage is also an unfavorable sign. The factor of age is important since in the more advanced years there should be less inclination to resect the stomach in those cases in which the lesion is very extensive.

For those lesions which are known to be extensive and when there is involvement of the stomach a left rectus incision has very definite advantages while in other cases a midline incision is usually as satisfactory as any. If there are no evidences of pentoneal implants the incision should be of sufficient size to admit the hand enable thorough exploration to be made and make possible satisfactory mobilization of the stomach.

In respect to the lymph nodes, unless it can be proved that enlarged lymph nodes outside the range of removal are malignant and that there is other evidence of distant metastasis it may be assumed that it is possible that these lymph nodes are only inflammatory, and resection can be carried out.

In the largest group of cases of cancer of the stomach a decision can promptly be made in respect to

confirming the diagnosis and determining the best method of management. In the case of larger tumors it may first appear that removal is not feasible. As a matter of fact the survival rates among patients with large lesions as contrasted with those with small lesions showed at the end of seven years that 33 per cent of the former were alive whereas only 24 per cent of the latter were alive.

If exploration discloses a small nodule in the liver or an implant on the rectal shelf, experience has shown that it is frequently to the advantage of the patient to perform palliative gastrectomy. When there is any indication of diffuse abdominal metastasis and when free fluid is present any type of palliative operation is of questionable value except possibly when a high degree of pyloric obstruction is present but even then gastro-enterostomy is likely to prove disappointing in its effect in relieving the obstruction. Lesions that are more or less confined to the antrum are usually resectable unless extragastric involvement precludes removal of all malignant tissue. Extension up along the lesser curvature particularly in the scirrhus type of cancer is all too frequently the reason for inoperability.

A very important group of cases is that with circumscribed growths high in the fundus which rest chiefly on the posterior wall and greater curvature. In these cases local excision can frequently be done with as good prospects of cure as with extensive gastrectomy. When small lesions are readily accessible they should be removed either by local excision and gastro-enterostomy or by gastric resection but when they are so located that their removal would entail a great risk, it is often better to assume that they are benign and perform only gastro-enterostomy.

When gastric resection is advisable the methods by which it is carried out will vary with the preference of the surgeon, the location and extent of the growth and the technical difficulties encountered. When recurrence takes place after the Billroth II procedure or any of its modifications the technical difficulties are not frequent and for this reason the Billroth II procedure is preferable for cancer.

When any technical difficulties are encountered in the Billroth II operation because of obesity or a short mesocolon an anastomosis in front of the colon has very definite advantages. Of the palliative procedures by far the most important is that by which the growth is completely excluded. This can be accomplished by employing the exclusion operation recommended by Devine for duodenal ulcer which in suitable cases is an extremely valuable palliative measure in cancer. It affords complete relief from the actual or impending obstruction and results in very definite prolongation of life in comfort. Palliative gastro-enterostomy is now generally recognized as too frequently being disappointing and is indicated but rarely.

With modern diagnostic methods as a result of which cancers are seen in the earlier stages the operability rate is about 43 per cent for those cases

in which exploration is carried out, and the mortality in those cases in which resection is carried out is between 10 and 13.9 per cent. The chief cause of death remains rather consistently peritonitis or pneumonia, or both, since either one or both of these conditions are present in 70 per cent of the cases in which death occurs.

When partial gastrectomy is possible, regardless of the degree of involvement of lymph nodes, the extent of resection, or whether the procedure is done as a palliative measure, approximately 32 per cent of the patients are alive and well five years after operation.

Marshall, S. F., and Kiefer, E. D.: Partial Gastrectomy for Gastric or Duodenal Ulcer. *J. Am. Med. Ass.*, 1937, 109, 1347.

Two hundred and forty-two patients were operated upon in the Lahey Clinic for gastric, duodenal, or gastrojejunal ulcer in the ten years from January 1, 1927, to December 31, 1936. During this time specific clinical features have proven to be definite indications for surgical intervention in the management of patients with duodenal ulcer. These were:

1 Pyloric obstruction with symptoms of active ulcer commonly due to spasm, infection, or edema. In most cases the symptoms could be relieved by rest, diet, and alkalis. Recurrent attacks of acute ulcer may, however, eventually produce scarring of the pylorus, shortening of the duodenum by scar formation, and real cicatricial stenosis which necessitates surgery.

2 Gross hemorrhage was found to indicate a somewhat more severe type of ulcer and its presence to decrease the probability of successful medical treatment. The occurrence of gross hemorrhage despite adherence to the ulcer regimen was a definite indication for surgical intervention because the prognosis with continued medical management was poor. Gross hemorrhage itself is a serious compli-

cation in ulcer patients, having a definite mortality of at least 5 per cent. This has led to the establishment of hemorrhage as a surgical indication.

The indications for surgical intervention in cases of gastric ulcer are somewhat different because of different clinical features in gastric lesions as contrasted to duodenal ulcer, and partly because of the technical difficulty in differentiating between some gastric ulcers and early carcinoma. Sara Jordan has shown that a large percentage of gastric ulcers will heal readily and completely with medical treatment. Surgical intervention is therefore indicated only for that gastric ulcer, which, because of the large size of the crater or extension into the adjacent tissues, proves impractical for medical measures, and for that type of gastric ulcer which, because of insufficient tendency to heal during medical management, is suspected of being an early carcinoma.

The selection of the type of surgical procedure is complicated by many factors. Gastro-enterostomy in properly selected cases is indicated because of its low mortality rate and smooth convalescence. It should, however, be restricted to patients who are past middle age, have low acid content and who have considerable cicatricial pyloric obstruction. In this type of patient the best results are obtained.

Gastrojejunal or jejunal ulcer is the most serious complication occurring after gastro-enterostomy. The reported incidence of its occurrence has ranged between 1.7 and 24 per cent, and it is the opinion of the authors that the percentage is nearer 24 than 1.7 per cent. Postoperative jejunal ulcer may also occur after partial gastric resection but much less frequently than after gastro-enterostomy. In this series of 102 patients, 5, or 6.7 per cent, had postoperative ulcers after resection.

The gross benefit accomplished by surgical management of ulcers results from the change in the gastric secretory and motor function. There is little

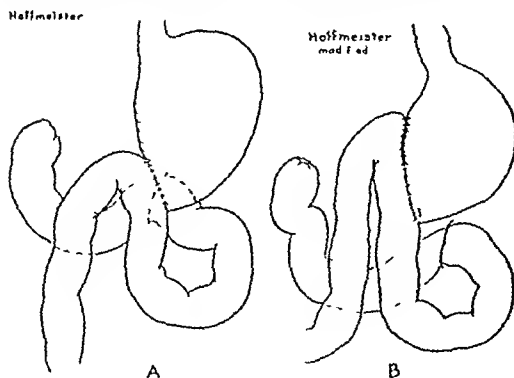


Fig. 1. A, the Hoffmeister type of gastroduodenal anastomosis following subtotal gastrectomy. B, a modification of the Hoffmeister anastomosis reinforcing the closed end of the stomach with jejunum. This is considered the procedure of choice.

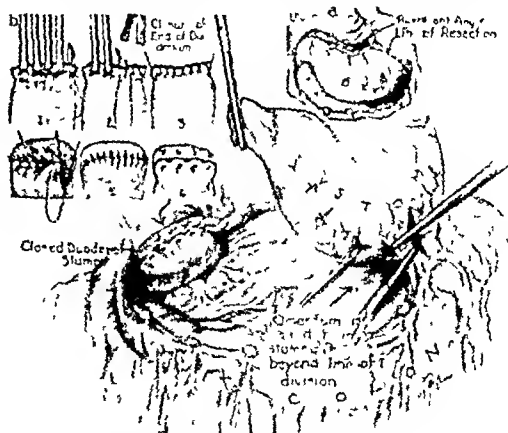


Fig. 2. The stomach is mobilized and the duodenum divided, a, line of resection of the stomach, b, method of closure of the duodenal stump.

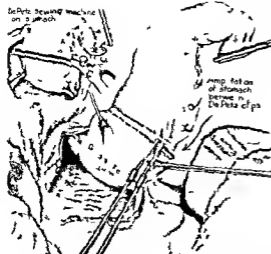


Fig. 3 The stomach is divided by cautery between the double row of clips applied by the de Pets clamp. Inset shows the application of the de Pets sewing clamp.

doubt that of all the surgical procedures partial gastrectomy accomplishes this change best. It is an operation of considerable magnitude beset with many technical difficulties and may be accompanied by a considerable mortality even in the hands of the most experienced and skillful surgeons. The authors have been able to reduce their mortality from 18 to 12 per cent. The death rate from subtotal gastrectomies was influenced first by the surgical technical factors associated with the operation and by the anesthesia, as well as the group of factors pertaining to the general physical condition of the patient and the pathological picture of the ulcer. These include size, depth, location, chronicity and surrounding tissue involvement.

During the past ten years under consideration 1,930 patients with duodenal ulcer were studied at the Lahey Clinic and 157, or 8 per cent, were operated upon. Of 192 patients with gastric ulcer, 44 were treated surgically. In 18 of the patients who were operated upon the ulcers were so adherent to the pancreas and the common duct that removal would have been followed by a mortality so high that the surgeons had no justification in persisting in their excision. These patients were treated by a Finsterer type of resection for exclusion, the fact kept in mind that in the presence of a high grade pyloric obstruction there is grave danger that accumulating secretions above the stricture will cause separation of the suture line leading to a fatal leakage. Once having decided on a radical attack on the ulcer the surgeon should really remove the stomach radically. Pylorotomy and antrectomy have practically the same mortality as partial resection, with little advantage over a gastro-enterostomy. Partial gas-



Fig. 4 Hofmeister method of gastrojejunostomy: the upper half of the divided end of the stomach is closed by inverting the clips. The jejunum is sutured to the remaining portion of the stomach. The clips are cut away in this area and the jejunum is incised, forming the stoma, the anastomosis is then completed.

trectomy means removal of at least three fourths or four fifths of the stomach. The operation should be radical enough to produce anacidity or hypacidity and a recurrence of the symptoms may follow the failure to obtain this result. If resection of the stomach is sufficiently radical there is little difference what type of anastomosis is made. The Billroth I type of procedure frequently cannot be used for large adherent eroding ulcers because their presence prevents adequate mobilization of the duodenum to permit an anastomosis of the duodenum to the resected stomach segment without dangerous tension. The authors have gradually been favoring the Hofmeister type of resection (Figure 1).

The removal of the stomach does not present any particularly trying technical difficulties but pains taking precautions must be taken against contamination from spilling of the gastric contents and hemorrhage. The real technical problem comes with the removal of large gastric ulcers which are penetrating and adherent to the pancreas and particularly with the removal of deep eroding adherent ulcers of the duodenum.

The surgeons at the Lahey Clinic prefer an abdominal incision to the left of the midline because the pylorus is normally only lightly to the right and is easily approached by a left rectus incision which permits a better approach to the body and lesser curvature of the stomach. Great caution must be used to prevent injury to the common duct and the pancreas. Enough of the duodenal tube must be left to permit easy inversion and safe suture. Emphasis is placed upon the importance of saving every possible bit of the duodenal tube and of not wasting it by suturing over a clamp. This may be accomplished by opening the duodenum widely and closing it with an in-and-out Connell suture of cat-

gut, or by grasping the divided duodenum with Allis clamps and closing it with a continuous suture of catgut followed by inversion (Figure 2)

A de Petz sewing clamp or a Fredericks modification of it has been utilized to great value by the Lahey group. The cautery is used to cut off the stomach (Figure 6). The upper portion of the resected end of the stomach is then inverted with a double row of catgut sutures reinforced until only a sufficient opening is left at the lower end of the closed stomach for the anastomosis. The jejunum is next brought anterior to the colon to permit a good-sized loop between the ligament of Treitz and the stomach to remain, after which the anastomosis to the cut end of the stomach is begun. Good results have been obtained whether the proximal jejunal loop is placed at the greater curvature or at the lesser curvature. The abdominal incision may be closed in layers by catgut or by means of through and through heavy black silk after peritoneal closure with catgut.

Anesthesia is of maximum importance in gastric surgery. At present spinal anesthesia with diluted nupercaine has been found to afford the greatest possibility for prolonged anesthesia without any undesired drop in the blood pressure.

The disturbing complications were pulmonary, such as pneumonia, pulmonary edema, and atelectasis. These caused 50 per cent of the mortality.

The convalescent period after partial gastrectomy was found to be prolonged. It was a common experience for patients to remain unable to work for from three to six months after leaving the hospital. The final clinical results were satisfactory and compared favorably with the end results of any major surgical procedure.

Of the series of 102 patients on whom gastric resection was done, 74 were accurately followed. The results were good or excellent in 84 per cent. Nine per cent were classified as poor or fair, and these patients had symptoms which were apparently caused largely by functional disorders of the gastrointestinal tract or by neurasthenia. Five patients had postoperative ulcer, 3 of these have recovered with surgical help and are now well, 1 is an invalid, and the fifth has not returned to the Lahey Clinic although he has reported to have had three postoperative hemorrhages. Of the 18 patients in whom a high resection was done with the exclusion type of intervention as described by Finsterer, 15 have been accurately followed and 14 have exhibited no recurrence of symptoms and are apparently in good health. One had a jejunal ulcer eleven months after operation, which responded to medical management. It is important to strive for a postoperative anacidity because of the tendency to occurrence of jejunal ulcer in patients in whom the acid has not been sufficiently reduced by partial resection. Unless anacidity or hypo-acidity is produced by high resection, it is difficult to see any clinical advantage of this operation over gastro-enterostomy.

SAMUEL J. FOGELSON, M.D.

Truesdale, P. E. Gastrojejunostomy in Retrospect. *New England J. M.*, 1937, 217, 462.

This essay includes the author's experience in the surgical treatment of ulcer with not only gastrojejunostomy, but also the other types of surgical intervention. Postoperative results have demonstrated to Truesdale that "The gastro-intestinal tract is a one-way canal. Gastro-enterostomy is a rational operation when the pylorus is stenosed by the cicatrix of an old ulcer. This operation is illogical when it leaves two openings, both of which continue to function."

The material evaluated consisted of 393 patients with peptic ulcer admitted to the surgical service of the Truesdale Hospital since 1908, 313 were treated surgically by the following methods:

Gastro-enterostomy	185
(In 5 cases the ulcer had perforated, requiring suturing of the perforation in addition to gastrojejunostomy.)	
Partial gastrectomy or pyloroplasty	74
Billroth I	8
Billroth II	39
Pólya	24
Von Eiselsberg	3
Suturing of perforation	45
Sleeve resection	2
Excision of ulcer and cauterization	4
Modified wedge incision with elongation of lesser curvature	3
	313

Forty-five of the 50 cases of acute perforated ulcer were treated by suture of the perforation, and 5 by an additional gastro-enterostomy. In the first group, 20 of the 45 patients are alive and well with no symptoms, 6 are obliged to follow a strict diet, and 2 could not be traced. Eleven died in the hospital from various causes. Of the 5 patients in whom gastro-enterostomy was also done, 3 are alive and well, but 2 died of peritonitis. Thus 23, or 46 per cent of the 48 patients traced are alive and well and have no symptoms. Thirteen of the 50 patients died in the hospital after operation, a mortality of 26 per cent for this entire group.

Death occurred in 9 of 185 patients on whom gastro-enterostomy was performed, a mortality rate of 4.9 per cent. Including the patients who died later of carcinoma of the stomach and those with jejunal ulcer and gastrojejunocolic fistula, there were 30 patients or 18 per cent of the 166 traced, who did not obtain relief from gastrojejunostomy.

Among 74 patients treated either by partial gastrectomy or pyloroplasty there were 2 postoperative deaths, a mortality of 2.7 per cent. Thirty-nine of these 74 patients were well and without symptoms, 2 were partially relieved. There were 2 postoperative deaths, 5 from cancer, and 14 other deaths were due to unrelated causes. There were 5 patients in whom the end-results could not be determined, and 7 who could not be traced. None of the 24 cases treated by the Pólya type of gastric resection showed subsequently any serious forms of blood dyscrasias.

Labey's discussion of this paper is of great interest in that he believed that gastro enterostomy as a routine procedure for duodenal ulcer is today unjustified. There are too many gastrojejunal ulcers. While one cannot definitely state what the accurate percentage is, it is too high to justify the method as a routine operative measure with which to treat surgical peptic ulcer. Despite this criticism however, there are cases in which gastro enterostomy must be employed. It may be used in the 'bad risk' patient who cannot tolerate the ideal procedure of subtotal gastrectomy. There are, in addition, certain individuals, notably people past middle life with cicatrizing chronic ulcers at the pylorus producing obstruction and with relatively low acid content who respond very well to gastro enterostomy. However, in the young individual who has a high acid content and a prospect of long life and does not have pyloric obstruction, gastro enterostomy frequently only adds to the ultimate seriousness of the ulcer situation. It is in these cases that subtotal gastrectomy is strongly advocated.

Moreover, in 17 cases in which resection for exclusion was performed in which the duodenum and the ulcer were undisturbed, and in which a high resection had been done, the 'follow up' showed end results quite as satisfactory as in those cases in which the duodenum was removed.

SAMUEL J. FOGELSON, M.D.

Butler, R. W. Traumatic Rupture of Intramesenteric Diverticula of the Jejunum. *Brit J Surg* 1937 25 277

Multiple diverticula arising at the mesenteric border of the jejunum are rare. Although there is disagreement as to the exact mechanism of their initial formation, there is general agreement that the diverticula initially push out directly into the mesentery and subsequently, as they enlarge, come to lie to one side or the other of the mesenteric border of the bowel. At these sites, they may increase to a diameter of from 2 to 3 in. Their points of origin are related to the vasa recta of the superior mesenteric artery, but whether traction on the wall of the bowel by these vessels is a factor in their formation or whether the diverticulum is pushed out by increased intestinal pressure along the channels made by these vessels are debatable points. As the diverticula increase in size they become thin walled sacs, the walls eventually consisting only of atrophic mucous membrane and scattered remnants of muscle covered by peritoneum.

Complications are rare, since the diverticula occur mainly in the first three or four feet of jejunum, in which the intestinal contents are very fluid and relatively sterile. Thus diverticulitis in this region is rare. Traumatic perforation likewise is rare; the author having found no cases reported in the literature.

The author reports the following case—

A man aged forty-two years, a carter, was admitted to the hospital under the author's care with

a history of having been kicked squarely in the abdomen by a horse four hours previously. Immediately after the accident he was faint and collapsed but had no abdominal pain for more than an hour. He then commenced to vomit and complained of intense abdominal pain.

Upon arrival at the hospital he was in profound shock; his pulse was rapid and of poor quality, the abdominal wall was completely rigid and the liver dullness had disappeared. A diagnosis of rupture of some hollow viscus was made and the abdomen opened by a right paramedian incision. When the abdomen was opened, a coil of small intestine, which proved subsequently to be the jejunum about 14 in. from the upper end, presented itself with a large aperture with loose everted and pouting edges on its right side at the mesenteric border from which bowel contents were escaping. The fluid which had already escaped from the perforation was confined mainly to an area to the right of the mesentery immediately around the perforation. This area was quickly packed off and mopped dry and the perforation closed by a purse string suture further reinforced by a second which inverted and buried the first.

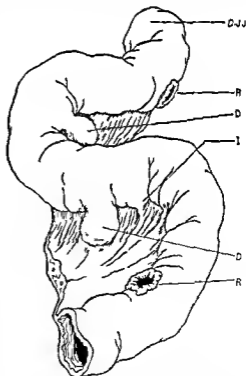


Fig. 1. Semi-diagrammatic sketch of the first part of the jejunum showing the position of the diverticula. DJJ Duodenojejunal junction. R Ruptured diverticulum. D Intact diverticulum. I Incipient diverticulum.

At this stage a diverticulum about 1 in in diameter was found at the mesenteric border of the bowel on the right side of the mesentery about 5 in above the perforation. The true nature of the perforation as a ruptured diverticulum now was apparent. The curious redundant margin of the perforation was explained as being the flaccid walls of the ruptured diverticulum falling back against the bowel wall.

A rapid survey was made for other diverticula, and another one, intact and of similar size, was found on the left side of the mesentery 4 in further toward the duodenojejunal juncture.

No diverticula of sufficient size to make them readily distinguishable in the fat of the mesentery were found distally, and there was no evidence of other perforations. The patient's condition was exceedingly poor and the abdomen was closed as rapidly as possible with drainage to the region of the perforation.

Abdominal rigidity and vomiting recurred, the patient's condition remained grave and in spite of all measures to combat shock he became gradually worse and died ten hours later.

At autopsy the abdomen was found to contain considerable quantities of fluid bowel contents, mainly toward the left side and down toward the pelvis. Tucked away behind the first part of the jejunum, only about 1½ in from the duodenojejunal junction, was a second and much smaller perforated diverticulum which had been missed at operation and had continued to leak into the peritoneum.

Probably at the time of operation traction upon the jejunum had kinked the bowel at this point, temporarily occluded the opening, and hid it still further by turning it away behind the bowel.

ARTHUR S W TOUROFF, M D

Ochsner, A., and Lilly, G.. *The Technique of Appendectomy* *Surgery*, 1937, 2 532

Three basic methods of handling the appendical stump are used by various surgeons today. They consist of (1) simple ligation of the stump, (2) ligation and inversion of the stump, and (3) inversion without ligation of the stump. Each of the methods has ardent advocates and proponents. Simple ligation of the appendix has the advantage that it is simple and readily performed. In those cases in which the cecal wall is inflamed and indurated, the introduction of purse-string sutures often is inadvisable because of the inability to invert the appendical stump on account of the thickened and indurated cecum. Ligation of the appendix also insures hemostasis. The disadvantages of simple ligation of the appendical stump are (1) inadequate closure of the bowel is likely because serosa is not brought in apposition to serosa, (2) the ligated stump which many times is infected lies free in the peritoneal cavity and may be a source of contamination, and (3) adhesions are likely to occur around the ligated stump. A case is reported in which a fatal termination occurred as a result of a blowing out of the ligated stump which was not inverted. A review of the literature shows a

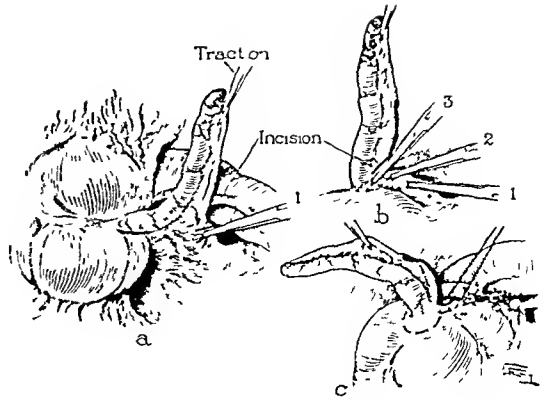


Fig 1 Method of division and ligation of the meso-appendix, as performed by the authors. As shown in a, the meso-appendix is not clamped or ligated *en masse*, but is caught with small forceps and each area divided and ligated individually. Following division and ligation of the meso-appendix a purse-string suture is placed around the base of the appendix as in c.

higher incidence of complications following simple ligation of the appendix than after any of the other techniques. Because of the great danger and high incidence of complications, the authors believe that it is just as illogical not to invert the appendical stump as it would be to leave the blind ends of the intestine uninverted following resection and a side-to-side anastomosis. No surgeon would ever advocate and much less practice non-inversion of such a blind stump. Numerous techniques have been devised to secure inversion of the mucosa and close apposition of the serosal surfaces in order that adequate closure of the suture line is secured by the fibrinous reaction of the peritoneum. The safety of gastro-intestinal surgery is dependent upon the presence of the peritoneum and its characteristic reaction, which should be utilized to the fullest extent by carefully apposing serosa to serosa.

Ligation and inversion of the appendical stump have been used because of the high incidence of complications following simple ligation of the stump. The stump is inverted so that it cannot become adherent to other viscera and peritoneal contamination cannot occur from it. Careful apposition of serosa to serosa is secured. A distinct disadvantage, however, is the violation of a surgical principle, viz., the burying of an infected stump in a closed cavity. Many cases have been reported in which an abscess has developed at the site of the ligated, inverted stump in which fortunately, however, recovery usually resulted because of rupture of the abscess into the lumen of the cecum. Such a case is reported by the authors. Another case in which an abscess apparently developed at the site of inversion with the production of peritonitis is also reported, in this case there was a fatal termination. As demonstrated by experimental work, the incidental infection



Fig. 2. a Blood supply of the appendix derived from the anterior and posterior cecal arteries. b Method of introducing a purse string suture in such a way as to include a possible intramural branch of the appendicular artery. As illustrated in the drawing the purse string suture is begun at the anti-mesenteric attachment passes through the submucosa at the base of the appendix and emerges on the opposite side of the meso-appendix. It is carried over to the beginning side and reinserted so that a loop, as shown by the arrow, is made around any intramural branch of the appendicular artery. The purse string suture is then carried around in a conventional manner back to the meso-appendix. In this way the possibility of hemorrhage from an intramural branch of the appendicular artery is prevented.

around the inverted stump in the closed cavity is much higher than is generally thought and results in a localized inflammation with the production of peritonitis and adhesions.

In order to obviate the danger of inversion of an infected stump into a closed cavity inversion of the appendix without ligation has been done. The method described by the authors consists of ligation and division of the meso-appendix. A purse string suture of No. 1 silk is introduced with an atraumatic needle in such a way as to include an intramural branch of the appendicular artery. This is accomplished by beginning the purse string suture on one side of the meso-appendix so that it passes down to and includes the submucosa and emerges from the opposite side of the meso-appendix. The suture is reinserted in the same manner and forms a loop around the mesenteric portion of the cecal wall and encircles any intramural branch of the appendicular artery. This loop suture is tightened to occlude any arterial branch which may be present and the purse string is continued around the cecum in the conventional manner. After the introduction of the purse string suture three crushing clamps are applied to the base of the appendix and the area is walled off with moist gauze packs to avoid any possible contamination or injury to the surrounding structure. The appendix is divided by means of the thermocautery between the upper and middle clamps. By means of a sponge the cauterized portion is wiped away from the middle forceps. The middle clamp is then removed and the crushed tip of the stump thus exposed is grasped with a pair of plain forceps before the third crushing



Fig. 3. Technique of appendectomy. a After introduction of the purse string suture in such a way as to include any intramural branch of the appendicular artery three crushing clamps are applied to the base of the appendix and the appendix is divided between the upper (1) and middle (2) clamps. b The upper (1) clamp on the meso-appendix is removed permitting the operator to grasp the crushed end of the appendix before the lower (2) clamp is removed. In this way the danger of pilage during inversion is obviated. c Inversion of the unligated stump into the cecum, following which the purse string suture is tightened. d Further inversion of the inverted stump is accomplished by the introduction of several Lembert sutures over the inverted stump and as a final procedure the ligated meso-appendix is sutured over the inverted stump thus peritonectomizing the entire area.

clamp is removed. Traction is then made on the fixed end of the purse string suture by pulling upward on this side of the suture. Traction is made at a point on the cecal wall opposite the site by catching the lineal band with a pair of toothed tissue forceps and lifting it upward. The remaining crushing clamps are then removed and the stump of the appendix is inverted through the purse string suture into the cecal lumen by pushing it downward with the smooth tissue forceps with which it has been held. The purse string suture is drawn tightly as the tissue forceps is gently freed and withdrawn. The site of the inverted stump is carefully compressed with a sponge and the purse string suture is tied. The site of the inversion is then reinforced by installing several Lembert sutures over the area of inversion by suturing the stump of the meso-appendix over the same area. In this way the only danger of non-ligation of the appendiceal stump is obviated. In any hemorrhage from an intramural branch of the appendicular artery which is present in about 15 per cent of the individuals is controlled.

The inversion without ligation of the appendiceal stump overcomes the objections to the other techniques in that (1) serosa is brought in apposition to serosa thus insuring firm healing of the cecal

wound and obviating danger of subsequent leakage from the cecum and peritoneal contamination, (2) contamination is prevented from an infected stump lying free in the peritoneal cavity, (3) careful peritonealization is secured, and (4) the infected appendicular stump is not buried in a closed cavity. Spillage of fecal material during inversion of the appendicular stump which has not been ligated is obviated by the use of three crushing clamps, two of which remain on the appendical stump after the appendix has been divided. By removing the upper of these two, it is possible for the surgeon to grasp the occluded stump by means of plain forceps before removing the last clamp. Inversion of the appendical stump without ligation will result in fewer complications and smoother convalescence postoperatively than ligation and inversion, or simple ligation of the stump.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Brailsford, J. F.: The Use of the Erect Position in Cholecystography for the Demonstration of Floating Gall Stones. *Brit J Surg*, 1937, 25, 280.

In routine cholecystographic examination, serial roentgenograms, taken with the patient in the erect position, sometimes will bring out features which may be unsuspected or unrevealed in films that are taken with the patient in the prone position.

The author reports a case in which cholecystographic examination, performed with the patient in the prone position, yielded inconclusive results. When films were taken with the patient in an erect position, however, numerous small, translucent gall stones were seen in the gall bladder. These stones were all of equal specific gravity and were suspended

about midway in the depth of the gall bladder, which produced a transverse line across the gall bladder and gave the appearance of an artefact. A film taken with the patient in the vertical position, but tilted to one side, disclosed that the line preserved its horizontal position, and thus the assumption of an artefact was ruled out. Accordingly, the diagnosis made was that of a collection of translucent stones floating in the gall bladder. This diagnosis was confirmed at operation, at which time numerous small stones, each about the size of a millet seed, were found in the gall bladder. The stones were hollow and, when placed in water, floated on the surface. The peculiar translucent, transverse line which was noted in the gall bladder films apparently represented the collection of stones floating at the same level in the gall-bladder bile.

ARTHUR S. W. TOUROFF, M. D.

Hill, H. A.: Functional Disorders of the Extrahepatic Biliary System: Biliary Dyssynergia or Dyskinesia. *Radiology*, 1937, 29, 261.

The author has approached the subject of functional disorders of the extrahepatic biliary system with the idea that it may act as an incentive for additional and more critical studies of the extrahepatic biliary system. There is a lengthy discussion of the various phases of anatomy and physiology, and of the motor functions of the extrahepatic biliary system. The physiological disorders of the tract, incidence, clinical findings, roentgenographic findings, diagnosis and treatment, and a discussion of reported cases are dealt with in detail. A bibliography of 120 contributions on this subject is included in the paper.

Adhesions, anatomical kinks, plugs of mucus, inspissated bile, strictures, or external pressure is believed to be the cause of persistence of old symptoms or of new complaints following operations on

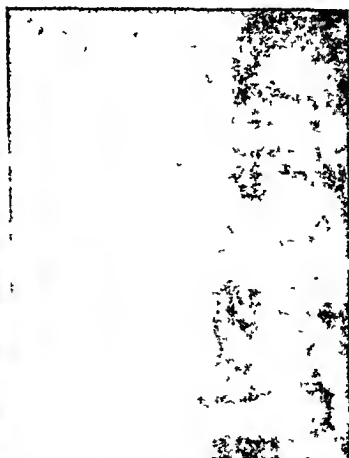


Fig. 1 Cholecystograph taken in the prone position
Fig. 2 Cholecystograph taken in the erect position

Fig. 3 Cholecystograph taken with the patient obliquely inclined from the erect position

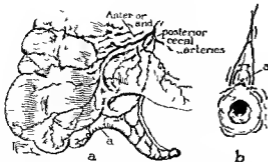


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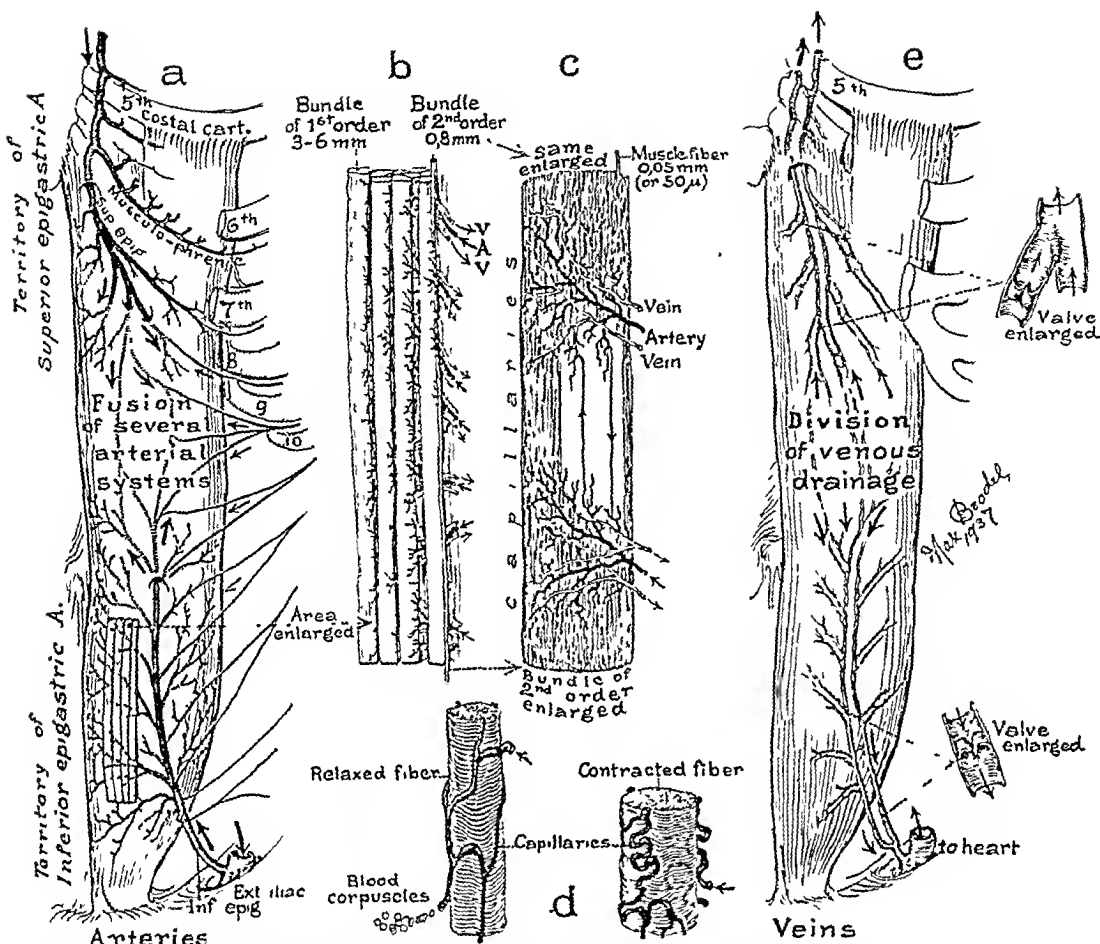


Fig. 2 Dorsal view, diagram of the entire rectus circulation. (a) The main arteries feeding the muscle, (b) the smaller arteries crossing bundles of the first order, each artery has two veins, (c) the smallest arteries crossing bundles of the second order, note short arterioles breaking up into dense capillary network, (d) relaxed and contracted muscle fiber showing difference in capillary pattern, compare size of blood corpuscle (7μ) with width of narrowest capillary (5μ), (e) the main veins and the direction of the blood flow. Excepting the venules, which drain the capillary network, all veins are double.

artery. In the embryo the two sources are independent but traveling toward each other. At the midpoint between the ensiform and umbilicus they meet in an undifferentiated plexus of arterioles. In the newborn the superior and inferior epigastric arteries have joined together through two or three anastomosing channels in the mid-epigastric portion of the muscle. Thus there is one continuous vessel which runs from the internal mammary artery over the entire dorsal surface of the rectus, lying in a shallow groove and adherent to or buried in the muscle for a short distance at the midepigastric region and again detached and mobile down to the external iliac artery. This is important in vagarious contraction and stretching of the muscle. The insignificant

terminal branches of the intercostal arteries play only a minor rôle in supplying the muscle with blood. The entire arterial system is accompanied by a double system of veins. The larger veins have valves which direct the blood upward above the midepigastric region and downward in the lower two thirds.

The area of the muscle below the umbilicus has the greatest surgical significance for this is the territory in which rupture and hematomas usually occur. When the inferior epigastric artery has crossed the lateral border of the rectus it ascends on its dorsal surface until it reaches the middle of the muscle. The main artery sends off branches at intervals of from 1 to 3 cm, short or long extramuscular

the extrahepatic biliary tract in the majority of cases. The remaining cases which could not be considered in this category were classed as functional disorders, most of which were disorders of motility. There is experimental and clinical proof that evacuation of the gall bladder is dependent upon intrinsic factors. The intramural portion of the common duct also plays an important rôle in gall bladder evacuation. The musculature of the gall bladder has been denied any motility by one school of workers but others believe that the extrahepatic biliary tract functions by means of the intrinsic musculature. The gall bladder and the sphincter of Oddi have been found to be coordinated in their activities by common innervation. In short the three factors upon which the discharge of bile depends are (1) the secretory pressure of the liver, (2) the contractility of the gall bladder and (3) the sphincteric action of the intramural portion of the common bile duct. The symptoms of spastic disorders are similar to those of mild gall stone colic, while gastro intestinal dyspepsia is simulated in the atonic form of dysfunction. The diagnosis has been found to be dependent upon the findings of the history, duodenal intubation and roentgenological studies. The treatment of these disorders is both medical and surgical. The final standardization of definite therapeutic regime has not been worked out.

RICHARD J. BENNETT, JR. M.D.

White B. V. Jr. and Gildea E. F. Adenoma of the Pancreas and Hyperinsulinism. *New England J Med* 1937, 41: 307.

A case of hyperinsulinism subsequently shown to be secondary to an islet-cell adenoma of the pancreas is reported together with observations on the effect of changes in diet, emotional factors and the administration of acid and alkali on the appearance of symptoms. The adenoma was unusual in that it was calcified and situated outside of the pancreas in the surrounding tissues.

A high carbohydrate and a low fat diet was beneficial while a low carbohydrate regimen obviously increased the frequency of symptoms. Large amounts of alkali or acid did not appreciably affect the appearance of symptoms. Emotional tension could not be definitely established as a factor.

WALTER U. NADLER, M.D.

MISCELLANEOUS

Guillen T. S. and Broedel M. Lesions of the Rectus Abdominis Muscle Simulating an Acute Intra Abdominal Condition. I. Anatomy of the Rectus Abdominis Muscle. II. Hemorrhage into or Beneath the Rectus Abdominis Muscles Simulating an Acute Abdominal Condition. *Bull Johns Hopkins Hosp* Balt 193 61: 295-311.

The authors have written a short monograph on lesions especially hemorrhage of the rectus abdominis muscle simulating acute intra abdominal conditions.

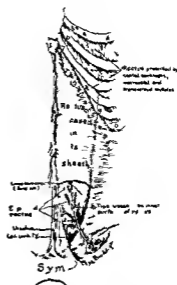


Fig. 1. Vulnerability of dorsal surface of lower rectum.

The first part deals with the anatomy of the rectus abdominis muscle with special reference to its blood supply. The anterior sheath of the muscle covers the entire ventral surface. It is attached to the transverse tendinous insertions. The posterior sheath is shorter than the anterior and ends in the linea semicircularis below that the rectus muscle has no sheath but is separated from the abdominal viscera by peritoneum and subperitoneal fascia. The posterior sheath is free all the way down to the Douglas line and is not adherent to the rectus at any point. The contracting and relaxing muscle can move freely up and down and on the posterior surface of this mobile muscle loosely attached to it runs the large inferior epigastric artery, with its two accompanying veins.

Broedel gives a very minute description of the arrangement of the muscle fibers both grossly and microscopically.

The nerve supply of the rectus abdominis muscle is from the fifth to twelfth thoracic nerves. The nerves enter the rectus sheath in the semilunar line usually accompanied by the insignificant terminal branches of the intercostal vessels. The per se traverse the posterior surface of the muscle, the sensory branches are usually directed toward the tendinous intersections and hence to the skin. The motor branches curve toward the muscle areas usually accompanying one of the larger oblique branches of the epigastric arteries.

The rectus muscle is supplied with arteries from above and below from above by the terminal branch of the internal mammary artery and the superior epigastric artery and from below by the inferior epigastric artery arising from the external iliac

GYNECOLOGY

UTERUS

Danforth, W. C. Tuberculosis of the Cervix. *Ann Surg*, 1937, 106 407

A review of the literature revealed the infrequency of tuberculosis of the cervix. The author reports the only case from his private practice. A biopsy was done because of a lesion which was suspected of being carcinoma. On section this revealed chronic inflammation, small areas of necrosis with giant-cell formation, and typical lesions such as are seen in tuberculosis.

Four types of tuberculous invasion are distinguished: the ulcerative, the milary, the papillary, and the interstitial. The ulcerative type is usually characterized by a single lesion, the edges of which are rather well defined. The ulcer bleeds easily upon contact but less so than in instances of carcinoma.

The papillary type may be confused with carcinoma, which it may resemble closely. In the milary variety the cervix is enlarged and small milary tubercles may be visible on the surface. The interstitial type appears first in the substance of the cervix, forming a nodule which may become necrotic. The necrotic material may be discharged, leaving a cavity.

Tuberculosis of the cervix is, in the great majority of cases, secondary to lesions at higher levels. These, in turn, are usually preceded by lesions elsewhere, usually in the lungs, from which the tubercle bacilli find their way to the pelvis through the blood stream. The method of progression from the uterine body to the cervix may be by continuity of tissue, through the lymphatics, or by the blood stream. The latter is the usual route of infection to the genital tract from an already existing pulmonary tuberculosis.

The symptoms of tuberculous infection of the cervix may not be marked. The evidences of cervical disease may be overshadowed by those of the adnexal involvement which is so frequently present. A moderate leucorrhoea may be present, but bleeding is usually absent or small in amount. Any excessive bleeding is likely to be due to a disturbance of ovarian function caused by tuberculous invasion. Tuberculous cervical lesions may be confused with venereal disease or may be mistaken for carcinoma. The latter is far more common and differentiation is important. The typical induration characteristic of carcinoma is absent, and the lesion does not bleed as easily upon contact. Examination of smears may reveal the tubercle bacillus, but care must be taken not to confuse it with the smegma bacillus.

The removal of a small piece of tissue for microscopic study is the most satisfactory method of diagnosis. Animal inoculation may be used, but this is time-consuming and is no more conclusive than histological examination.

The author recommends the following treatment:

If the condition of the patient permits, the best management is complete hysterectomy. If the strength of the patient does not warrant radical surgical intervention, or if extensive tuberculous invasion of the peritoneum renders cure very improbable, operation may be withheld. Pulmonary involvement sufficiently advanced that the pelvic tuberculosis is of secondary importance renders operative treatment of the pelvic tuberculosis unwise.

If it is quite certain that the cervical tuberculosis is primary, amputation of the cervix will suffice. It is, however, difficult to be sure of this without an inspection of the reproductive organs and contiguous peritoneum from above. Primary tuberculosis of the cervix, or tuberculous disease limited to the cervix, is found in only from one-fifth to one-fourth of the cases of cervical tuberculosis.

ROBERT M. GRIER, M.D.

Counseller, V. S. Uterine Myomas. *J Am M Ass*, 1937, 109 1687

Some of the fundamental facts to keep in mind in undertaking treatment of myomas are their blood supply, their cleavage planes, and their manner of growth. Generally speaking, myomas of all sizes are practically devoid of blood vessels. They obtain their blood supply from a thin capillary network from the vessels of the myometrium. For this reason, operation can be undertaken with practically no fear of troublesome hemorrhage. However, this rule does not hold for large pedunculated tumors that have a large pedicle, for the pedicle is usually extremely vascular, and large tumors may be soft and filled with excessive amounts of blood, so that retrograde bleeding from the tumor may be severe.

Tumors that are growing in the myometrium compress the musculature of the uterus around the tumor and have the appearance of being encapsulated. The tumor, which is much firmer than the myometrium, can be readily enucleated when the cleavage plane between the tumor and the myometrium is entered.

The situation of the myoma in relation to the uterus is highly important in selecting the type of surgical treatment. The greater proportion of the tumors are situated in the body of the uterus, usually on the anterior or posterior wall. They are usually designated as subserous, interstitial, or submucous, according to whether they are under the peritoneum, embedded in the wall of the uterus, or under the mucosa. It is frequently in connection with the removal of an interligamentous myoma that the ureter is injured. There is one maneuver which, if carried out at this point, will definitely determine whether one is handling the ureter or not. If the ureter is snipped or otherwise irritated with the thumb forceps, it forcibly contracts, this distinguishes it from blood vessels. Any attempt to re-

branches. These usually travel over the dorsal surface for quite a long distance before their twigs plunge into the muscle. This arrangement protects the vessels, the artery and the two veins, in case of excessive muscular activity. The branches enter so they can spread out at nearly right angles to the muscle bundles. If an occasional artery runs parallel to the muscle it shows greater tortuosity. The arterioles come off at right angles from these branches or form a delicate longitudinal network of parallel capillaries. The arteries are less apt to tear than the veins as they are frail of smaller caliber and of much thinner wall.

The second portion of the article by Cullen deals with hemorrhage into or beneath the rectus muscle simulating an acute abdominal condition. He reviews the literature and presents histories of 5 cases of hemorrhage. A study of the cases showed hemorrhage following both direct injury and indirect injury of the rectus. Diagnosis of cases due to direct injury is very clear. The symptoms due to indirect injury are very acute. The hemorrhage may be due to tearing of the vessels, rupture of the muscle or both. The hemorrhage is usually below the umbilicus and limited to one side. In another series it was noted 45 times on the right, 33 times on the left and only 5 times above the umbilicus. Occasionally there is discoloration of the abdominal skin. When hemorrhage is below the umbilicus the free blood may lie directly against the peritoneum and produce irritation and pain suggestive of an intra abdominal lesion. He follows with a report of cases from the literature to show the various symptoms noted.

Hemorrhage of the rectus muscle has simulated nearly every form of acute abdominal disease such as appendicitis, twisted ovarian cyst, ovarian ab-

cess, ruptured tubal pregnancy or intestinal obstruction. In many cases the true condition remained obscure until an incision was made. In cases in which rupture of the rectus sheath had occurred, staining of the abdominal fat was always noticed. Diagnosis of this condition may be very difficult.

Causes of rupture or hemorrhage of the rectus muscle are listed. Rupture may occur from muscular exertion but usually the patients are suffering from some debilitating or infectious disease. Rupture and hemorrhage are occasionally noted during pregnancy. Rupture often occurred following typhoid fever. This was thought to be caused by the hyaline or waxy degeneration of the rectus muscle frequently occurring in this disease. These changes were known as Zenker's degeneration. Influenza or influenza pneumonia shows a similar degeneration of the rectus fibers and rupture and hemorrhage occur. Heart disease has a share in the causation of hematoma of the rectus. Hemorrhagic diathesis seems to have played only a minor rôle in the reported cases. Surgical operations are sometimes the cause of the hemorrhage as when the rectus is drawn strongly to one side and causes some bleeding. Additional causes are gall bladder disease, tetanus and syphilis.

Treatment as a rule calls for opening of the sheath of the rectus, removal of the clot, ligation of any bleeding vessels and suture of the muscle if necessary. Sometimes the blood is intimately blended with the muscle and cannot be removed. When hemorrhage is slight no operation is required.

Abscess may occur beneath the sheath of the rectus muscle especially in cases of influenza or typhoid.

HARVEY S. ALLEN, M.D.

GYNECOLOGY

UTERUS

Danforth, W. C. • Tuberculosis of the Cervix. *Ann Surg*, 1937, 106 407

A review of the literature revealed the infrequency of tuberculosis of the cervix. The author reports the only case from his private practice. A biopsy was done because of a lesion which was suspected of being carcinoma. On section this revealed chronic inflammation, small areas of necrosis with giant-cell formation, and typical lesions such as are seen in tuberculosis.

Four types of tuberculous invasion are distinguished: the ulcerative, the miliary, the papillary, and the interstitial. The ulcerative type is usually characterized by a single lesion, the edges of which are rather well defined. The ulcer bleeds easily upon contact but less so than in instances of carcinoma.

The papillary type may be confused with carcinoma, which it may resemble closely. In the miliary variety the cervix is enlarged and small miliary tubercles may be visible on the surface. The interstitial type appears first in the substance of the cervix, forming a nodule which may become necrotic. The necrotic material may be discharged, leaving a cavity.

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move a large myoma in this situation without adequate exposure and without opening the broad ligament wide so that important structures can be readily seen will result in troublesome hemorrhage and perhaps injury to the ureter and bladder. The necessity for determining the position of the ureter and protecting it from injury is further increased by the fact that it may be the only functioning ureter that the patient has left. The other ureter may be congenitally absent or may have been destroyed by disease or by pressure in the broad ligament or it may have been injured in a previous pelvic operation.

A myoma that extends from the posterior wall of the uterus far down behind the peritoneum of the cul de sac or Douglas is one that presents several technical difficulties in its removal. It is usually this type of myoma that is occasionally exposed and considered inoperable; the patient is then subjected to radium or roentgen therapy. If exposure is adequate and the condition thoroughly recognized the tumor can be removed by careful dissection after retraction of the blood vessels in the fat of the mesentery of the colon.

A myoma that originates from the anterior uterine wall near the cervix may cause considerable distortion of the bladder. If in separating the bladder the wall of this organ is injured, it is a much safer procedure to resect the wall of the bladder leave it attached to the myoma and then close the bladder with two rows of No. 1 plain catgut sutures.

Myomas that grow toward the uterine cavity form a distinct group and their surgical management is therefore different. As they extend toward the uterine cavity they become fixed beneath the mucosa; therefore they have been called submucosal myomas. The submucous myoma is frequently troublesome and difficult to identify. Such tumors are often overlooked; if so, the excessive menorrhagia and metrorrhagia continue as they did before. Such patients too often are given a castrating dose of radium or roentgen rays. If the patients are less than forty years of age these myomas should be removed surgically. Two methods are available.

1. If the cervix is thoroughly dilated the tumor may be grasped with a tenaculum and then with one hand on the fundus to hold it in position the surgeon may extract the tumor from the uterine wall by careful rotation and gentle traction. Subsequent bleeding is rarely of major importance and is usually controlled by packing the uterus with gauze for from twenty-four to forty-eight hours.

2. If the first maneuver is unsuccessful the myoma should be removed by abdominal myomectomy. It should always be removed by the latter procedure if there are other myometrial or subserous myomas which also should be removed.

Pedunculated submucous myomas act exactly as a foreign body in the uterine cavity. As the tumor increases in size the uterus endeavors to expel it the same as it does a large blood clot. Vaginal myomectomy is the only procedure ever to be employed in

the removal of such myomas. Following removal of the tumor the interior of the uterus should be cleansed with some antiseptic solution such as an aqueous solution of merthiolate or mercurchrome or a weak solution of iodine. If bleeding seems excessive packing with gauze is usually sufficient.

If these pedunculated myomas are associated with others which necessitate an abdominal hysterectomy, this procedure must most emphatically be deferred several weeks until the cervix has assumed a normal consistency and the uterus is free from infection. It is decidedly dangerous to attempt a total abdominal hysterectomy when there is a pedunculated myoma extending into the vagina since the tumor is always infected and peritonitis is almost certain to follow. The same is true if hysterectomy is attempted too soon following vaginal myomectomy, as the lymphatics will continue to contain streptococci which may produce a fulminating peritonitis and death of the patient.

Cervical myomas which fortunately are not common, present one of the most difficult surgical situations in gynecology. Their removal is necessary and always difficult on account of their position and the inherent danger of injuring adjacent structures. When excessive hemorrhages develop they are often treated with the roentgen rays on account of the technical difficulties presented in their surgical removal which as a rule is inadequate. Unlike the pedunculated myomas which protrude through the cervix they are not infected; therefore surgical exploration can be instituted immediately. Myomectomy may occasionally be performed if the fundus is not involved by the tumor (Figures 1 and 2). On account of the tendency of these tumors to grow backward toward the cul de sac of Douglas and upward the abdominal type of hysterectomy is preferable.

Abdominal myomectomy subtotal hysterectomy and total hysterectomy may also be considered in the treatment of myomas. The choice of any of these procedures depends on the size, number and situation of the tumors, on the age of the patient, and on the condition of the cervix. During the sexual life of the patient it is imperative to conserve both the menstrual and the reproductive function. Myomectomy is the only conservative procedure and the operation of choice in the third and fourth decades of life.

All large myomas and all small ones except submucous pedunculated myomas which produce symptoms after the patient is forty years of age are treated best by the radical procedure of hysterectomy. Myomectomy may be considered if the patient prefers that the sexual organs be left intact.

Irradiation is often utilized in the treatment of some of the smaller fibroids, especially if it has been previously determined that they are incidental and not primarily the cause of the uterine bleeding. Irradiation at this period of life will be more likely to effect a cure than it will in the earlier years of life since the recuperative power of the ovary has practically ended.

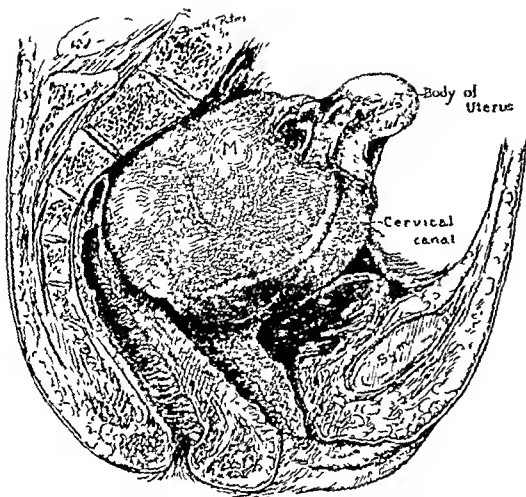


Fig 1 Diagrammatic sketch of cervical myoma in a young woman whose pelvic organs were otherwise normal

The question of whether a subtotal or total hysterectomy should be performed when removal of the uterus is indicated for benign conditions should be determined by the condition of the cervix of the uterus. It is rather generally agreed among gynecologists that the vagina is left in a more normal condition if a normal cervical stump is retained than if the cervix is removed. The cervix should be firm and free from cysts, lacerations, and erosions.

The formation of a support of the vaginal vault following total hysterectomy is a procedure of major importance. It is preventable if the pelvic fascia is accurately attached to the sides of the vagina.

Since operations on the uterus occasioned by myomas are among the most frequent gynecological procedures, each patient must be carefully studied and the method of procedure determined from the position of the myoma, whether the tumors are single or multiple, and from the age of the patient. If hysterectomy is indicated, a careful inspection of the cervix is necessary for choosing between the total or subtotal technique. Finally, the support of the cervical stump or vaginal vault, as the case may be, may determine the success or failure of the operation so far as the patient is concerned.

Todd, T. F.: Pathways and Relief of Pain in Advanced Carcinoma of the Cervix Uteri. *Lancet*, 1937, 233 555

Todd describes the two types of pain, visceral and somatic, to be considered in carcinoma of the cervix. Visceral pain is limited to the lower abdomen and pelvis and is typically diffuse. The afferent path is that of the sympathetic nerves. Somatic pain is experienced in the thigh and leg and in the distribution of the lumbosacral nerves. It is unassociated with any visceral lesion and the afferent path is the

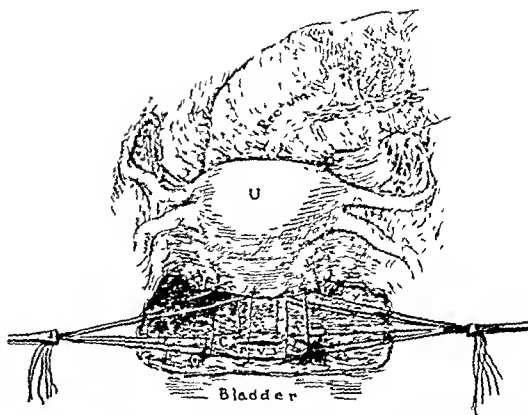


Fig 2 Successful removal of the tumor with reattachment of a rim of cervical tissue to the uterus; menstrual function was normal

ordinary somatic one. The criteria used in judging the severity of the pain are important, and may be estimated by the inability of the patient to sleep and her willingness to submit without question to any therapeutic measure suggested. As to the cause of pain, the author considers the process to be due, in most cases, to a root lesion rather than to pressure or metastasis. The method of determining the type of pain in each case is stressed. Once the visceral nature of the pain is diagnosed, the afferent pathway should be sectioned, or the viscus itself attacked.

The author has treated 15 patients for severe visceral pain. In 4 of these, relief was obtained by direct methods. The first patient was found to have rectal pain and tenesmus associated with ulceration and stenosis, here a colostomy produced relief. The second patient presented a necrosis of the uterine wall following gross overdosage with intra-uterine radium in the treatment of menorrhagia, relief followed pan-hysterectomy. The third and fourth patients suffered severe bearing down pains, ensuing five and eighteen months respectively after treatment of a cervical and body growth, in each case evacuation of the pyometra that had developed was sufficient to give relief. Presacral neurectomy was done in the cases of 11 patients, in 5, for pain associated with a chronic rectal reaction, in which cases it was also hoped that the resulting increased vascularity would accelerate the healing process, in 4, for advancing malignancy involving the bladder and causing extreme dysuria, and in 2 for visceral pain with gland metastases. Sympathectomy relieved them. There was no operative mortality, though the patients were all poor risks. The only complication observed was transient incontinence of urine and feces. Failure in such cases is usually due to the fact that the operation is done when somatic pain exists, and then this method can be of no value.

Somatic limb pain was present in 18 of the patients whose cases are reported. It was found fairly

exactly in the distribution of one or more spinal nerves and was neuralgic in character. Objective neurological signs were not infrequent. All cases were associated with advanced carcinoma of the cervix which had been treated by irradiation and all fulfilled the criteria of severity laid down by the author. Bone metastases were never demonstrable.

There are two methods of interrupting the afferent path of the nerves producing this type of pain, i.e., injection of intrathecal alcohol or choledotomy. The author used the former method with the following details in technique. The injection of $\frac{1}{2}$ to 1 cc. of absolute alcohol was given high enough to block the segment producing the pain. The patient was positioned so that the sacral and lumbar spine was elevated and remained in this position for at least one hour after the injection. No premedication was used. The first patient was treated over a period of eighteen months and the last one reported over four months ago. In the cases of 2 patients a successful first injection had to be repeated after an interval of three months. Of the original 18 injections 4 were not successful. One of the patients refused a second injection and 3 were given repeated injections with successful results, the relief lasting six, ten and four months. The maximum period of relief so far has been sixteen months. The average period of relief has been five months per case per injection and this despite the death, from growths of 4 patients within one month of the time of the injection.

The author concludes that the adoption of such rational methods of therapy as these should make it possible to dispense almost entirely with opiates in the terminal phases of uterine malignancy. Research is being continued in particular with regard to the cause of the limb pain and in the study of any late effects of intraspinal injections of alcohol.

HARRY W. FOX, M.D.

ADNEAL AND PERIUTERINE CONDITIONS

Iwanow I I. Our Knowledge Regarding Granulosa Cell Tumors. (*Zur Kenntnis der Granulosa-Zell-tumoren*). *Zuchr f. Geburtsh. u. Gynaek.* 1937 115: 302.

Nineteen cases of granulosa cell tumors were studied regarding the behavior of the gutter or lattice work fibers. The staining method of Tibor Pap and the Azan stain were employed.

The number and the arrangement of the latticed fibers varied greatly. In diffuse extension of the tumor cells there could be found fine meshed nets even including only solitary cells at other times there were only very few fibers present. More frequently an extensive development of fibers was found. The trabecular development of the tumor cells was also extensive. Wherever the formation of spherical masses of tumor cells occurred with or without lumen formation the fibrous mesh was generally much less dense. In follicle-like masses, sharply differentiated and containing secretions the latticed

fibers were missing between the tumor cells. Also in diffuse masses of cells the latticed fibers were scant and were entirely absent where pseudofollicles appeared or where without differentiation of such follicles secretion appeared. Even where there were large cystic spaces lined by granulosa cells the fibers were absent. In normal follicles the theca cells were not surrounded by latticed fibers. The granulosa cells are usually free from these fibers.

It cannot be maintained that the higher differentiation of well developed follicle-like structures develops in association with a higher hormonal content. The fact that these structures are poor in latticed fibers speaks against the belief that higher formal differentiation signifies greater functional development. We also do not know what physiological significance can be attached to the paucity of these latticed fibers in the cellular blocks of cystic tumors. As in the normal follicle so also in the granulosa cell tumor the cell produces folliculin irrespective of whether there is differentiation or not. From the arrangement of the latticed fibers no prognostic conclusions can be drawn. It is impossible to tell benign from malignant cases from the difference in number or arrangement of the latticed fiber.

(FRANKL) LEO A. JUNKER, M.D.

Slimecek A. Diagnosis of the Krukenberg Tumor. *Am. J. Cancer* 1937 31: 21.

Since the time of Krukenberg in 1896 all ovarian tumors which enlarge the ovaries uniformly without distortion which present alterations of fibrous areas with mucinous cell groups and which press along the lymphatics are called Krukenberg tumors. These tumors occur with the greatest frequency in women about the age of thirty-five. They are bilateral in most instances and produce a general enlargement of the ovary which keeps its form and is usually free of adhesions. They are accompanied by ascites, they metastasize early and are almost invariably fatal. The original concept that these tumors are primary in the ovary has been refuted by most pathologists who agree that pure Krukenberg tumors are always secondary to carcinoma elsewhere. They are seldom diagnosed before operation or autopsy and perhaps not even then.

The case reported by the author illustrates the difficulty of the clinical diagnosis of Krukenberg tumors and of diagnosis even at autopsy. There is often a remarkable disproportion between the size and extent of the primary tumor and its subsequent metastases. Grossly the intestinal tract may appear negative and only upon detailed search is a small suspicious area found which in microscopic section enables the pathologist to make a diagnosis.

The patient whose history is outlined in the report was a white housewife aged thirty-three who complained of swelling of the labia majores of two years duration. The legs had been edematous for the past year and the edema had gradually increased and extended upward to the abdomen and back. The menstrual history was not significant. Upon en-

trance examination the patient was described as cachectic. Gynecological examination revealed a small uterus and on the left side a large tumor filling the lower abdomen and extending to about two fingers below the umbilicus. Another smaller tumor could be palpated in the right lumbar region. A diagnosis of cystadenoma of the ovary was made, in spite of a transfusion the course was rapidly downhill and death ensued three weeks after entrance.

At autopsy the gastro-intestinal tract was negative except for an inconspicuous ulcer of the lesser curvature of the stomach which was situated near the pylorus and measured 2 cm in diameter. The abdominal cavity contained 3 liters of opalescent fluid. Large tumors of both ovaries were found, the surfaces of each consisting of irregular, yellowish-white nodules. On section the tissue appeared somewhat gelatinous with several whitish areas of more compact consistency. Microscopically the structure was quite characteristic of the Krukenberg tumor. Sections from the ulcer in the stomach showed the mucosa entirely replaced by tumor tissue which penetrated directly into the submucosa where the cells were of the signet-ring variety seen in Krukenberg tumors. The author believes that the growth here was primary and not metastatic. The path of transmission of the growth could not be determined in this case since metastases were so widespread and probably involved the lymphatics and blood stream.

HARRY W. FINK, M.D.

Moequet, P., and Rouvillois, C.: The Arterial Blood Supply of the Ovary from the Viewpoint of Conservative Surgery (*La vascularisation artérielle de l'ovaire, étudiée en vue de la chirurgie conservatrice*). *Mém. l'Acad. de chir., Par.*, 1937, 63: 1061.

Moequet and Rouvillois present a study of the arterial blood supply of the ovary. In this study they use the term tubo-ovarian to designate the artery usually called utero-ovarian.

In 12 specimens studied, the ovarian branch of the uterine artery formed a direct anastomosis with the ovarian branch of the tubo-ovarian artery, and the branch thus formed extended along the hilus of the ovary and sent arterioles "like the teeth of a comb" into the ovary along the entire course. In some cases a group of these arterioles originated from a single short branch coming from the main branch. Sometimes there was a secondary anastomosis which either followed the course of the main branch closely or was found in the mesosalpinx. In these cases it was impossible to separate the territory supplied by the uterine artery from that supplied by the tubo-ovarian artery. In another variety of this type arterioles entered the artery from each end of the main branch but not from the middle. In this type a ligature placed at one pole or the other of the ovary did not interfere with the blood supply of the organ.

Another type of ovarian blood supply was also found in 12 specimens. In one variety of this type

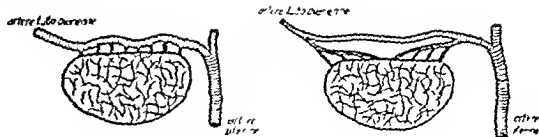


Fig 1

Fig 2

Fig 1. Anastomosis without distinction of areas supplied by uterine and tubo-ovarian arteries.

Fig 2. Anastomosis with distinct territories supplied by the uterine and the tubo-ovarian arteries.

there was an anastomosis between the ovarian branches of the uterine and tubo-ovarian arteries, but the external portion of the branch thus formed was at a considerable distance from the ovary, and the arterioles that entered the ovary from this portion were long. In another variety of this type, the ovarian branch of the tubo-ovarian artery sent arterioles into the ovary, while another branch formed an anastomosis with the uterine artery, the latter also had an ovarian branch which sent arterioles into the internal half of the ovary, while another branch formed the anastomosis with the tubo-ovarian artery, this anastomosis sent no arterioles into the ovary. The blood supply from the uterine and the tubo-ovarian arteries in this type was distinct.

In a third type, found in only 4 of 30 specimens, the blood supply of the ovary came entirely from the uterine artery, the ovarian branch of this artery passed along the ovary, and sent arterioles into it. At the upper pedicle of the ovary it was drawn upward, forming a curve, and there the tubo-ovarian artery entered it, but the latter was small in caliber, in 1 case no tubo-ovarian artery was seen.

In 2 cases the blood supply of the ovary came from the tubo-ovarian artery, no arterioles entered the ovary from the uterine artery or its branches.

It was evident that the blood supply of the ovary was independent of the blood supply of the fallopian tube, and with proper precautions not to injure any of the vessels supplying the ovary, the tube could be removed without interference with the ovarian blood supply.

ALICE M. MEYERS

MISCELLANEOUS

Mussey, R. D.: The Management of Pelvic Inflammation. *Surg. Clin. North Am.*, 1937, 17: 1115.

ACUTE PELVIC INFLAMMATIONS

Gonorrhea. The gonococcus is said to cause between 70 and 80 per cent of inflammatory lesions of the pelvis, postabortal and postpartum infections are responsible for a large part of the remainder, while from 5 to 10 per cent, and particularly tubal lesions, are due to tuberculosis. Among women with pelvic inflammation, the two chief causes of chronic inflammation are nearly reversed in the relative frequency of occurrence, and there are comparatively few cases of tuberculous involvement.

exactly in the distribution of one or more spinal nerves and was neuralgic in character. Objective neurological signs were not infrequent. All cases were associated with advanced carcinoma of the cervix which had been treated by irradiation and all fulfilled the criteria of severity laid down by the author. Bone metastases were never demonstrable.

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HARRY W. FINE, M.D.

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The number and the arrangement of the latticed fibers varied greatly. In diffuse extension of the tumor cells there could be found fine meshed nets even including only solitary cells at other times there were only very few fibers present. More frequently an extensive development of fibers was found. The trabecular development of the tumor cells was also extensive. Whenever the formation of spherical masses of tumor cells occurred with or without lumen formation, the fibrous mesh was generally much less dense. In follicle like masses sharply differentiated and containing secretions the latticed

fibers were missing between the tumor cells. Also in diffuse masses of cells the latticed fibers were scant and were entirely absent where pseudofollicles appeared or where without differentiation of such follicles secretion appeared. Even where there were large cystic spaces lined by granulosa cells the fibers were absent. In normal follicles the theca cell were not surrounded by latticed fibers. The granulosa cells are usually free from these fibers.

It cannot be maintained that the higher differentiation of well developed follicle like structures develops in association with a higher hormonal content. The fact that these structures are poor in latticed fibers speaks against the belief that higher formal differentiation signifies greater functional development. We also do not know what physiological significance can be attached to the paucity of these latticed fibers in the cellular blocks of cystic tumors. As in the normal follicle so also in the granulosa cell tumor the cell produces folliculin irrespective of whether there is differentiation or not. From the arrangement of the latticed fibers no prognostic conclusions can be drawn. It is impossible to tell benign from malignant cases from the difference in number or arrangement of the latticed fibers.

(FRANKL) LEO A. JUVENES, M.D.

Simecek, A. Diagnosis of the Krukenberg Tumor. *Am. J. Cancer* 1937 31: 31.

Since the time of Krukenberg in 1896 all ovarian tumors which enlarge the ovaries uniformly without distortion, which present alterations of fibrous areas with mucinous cell groups and which propagate along the lymphatics are called Krukenberg tumors. These tumors occur with the greatest frequency in women about the age of thirty five. They are bilateral in most instances and produce a general enlargement of the ovary which keeps its form and is usually free of adhesions. They are accompanied by ascites, they metastasize early and are almost invariably fatal. The original concept that these tumors are primary in the ovary has been refuted by most pathologists who agree that pure Krukenberg tumors are always secondary to carcinoma elsewhere. They are seldom diagnosed before operation or autopsy and perhaps not even then.

The case reported by the author illustrates the difficulty of the clinical diagnosis of Krukenberg tumors and of diagnosis even at autopsy. There is often a remarkable disproportion between the size and extent of the primary tumor and its subsequent metastases. Grossly the intestinal tract may appear negative and only upon detailed search is a small suspicious area found which in microscopic section enables the pathologist to make a diagnosis.

The patient whose history is outlined in the report was a white housewife aged thirty three who complained of swelling of the labia majora of two years duration. The legs had been edematous for the past year and the edema had gradually increased and extended upward to the abdomen and back. The menstrual history was not significant. Upon ex-

foreign protein, such as typhoid vaccine or sterile milk. This method of treatment has some merit.

The temperature of the human body can be raised artificially to as high as 105° or 107° F and maintained at this temperature for a number of hours under carefully regulated conditions without harmful effects. Various methods of producing heat in cabinets enclosing the entire body of the patient except the head, have been devised. Desjardins, Stuhler, and Popp have described the use at the Mayo clinic of the hypertherm cabinet, devised by Simpson in collaboration with Kettering. Sufficient heat is produced to raise the rectal temperature of the patient to 105° F in sixty to ninety minutes. A body temperature of 105° to 106° F is maintained for about five hours on the first day of treatment. While the patient remains in the cabinet, cold is applied to the forehead, and to counteract profuse sweating the patient is given copious amounts of iced salt water (0.6 per cent saline solution) to maintain a mineral and fluid balance. A nurse is in constant attendance and a physician is at hand. Treatments are given every third or fourth day. On the second and subsequent treatments the temperature of the patient is kept at 106° to 107° F for six hours. An average of six treatments has been given.

More recently, Randall and Krusen have increased the length of the sessions of fever and reduced the number of sessions, and treatments have often been accompanied by the use of the vaginal diathermy or Elliott vaginal bag at an average heat of 125° F. This maintains a greater local heat than has been possible by raising only the body temperature. The disease is not considered cured until four to six negative cultures are obtained, at least one of which is taken, if possible, directly following a menstrual period. This treatment is not without risk, as deaths have been reported by various observers.

Fever therapy may be employed for neisserian urethritis and cervicitis not complicated by salpingitis or for those patients with acute or chronic salpingitis whose general condition will permit. When salpingitis is accompanied by symptoms of acute pelvic peritonitis, treatment is usually deferred until there is evidence of local resistance to the infection. Cabinet heat treatments have been followed by more than 85 per cent of cures in more than 200 cases of acute or chronic gonorrhea with or without tubal involvement.

CHRONIC PELVIC INFLAMMATIONS

Differential diagnosis. When chronic inflammation of the pelvis is encountered, it is necessary to rule out certain other conditions before proceeding with treatment. Chief among these are tuberculosis of the adnexa, chronic diverticulitis of the sigmoid, infected uterine myomas, infected ovarian cyst, chronic appendiceal abscess, and pelvic endometriosis. Any of these conditions may simulate chronic pelvic inflammatory disease, and it is not always possible to make the differential diagnosis. It is not always possible to determine whether the

condition is associated with, or secondary to, gonorrheal salpingitis, or whether it is a sequel to pelvic cellulitis resulting from postgestational infection.

Gonorrheal disease of the fallopian tubes tends to become self-limited unless reinfection occurs. On the other hand, the infectious organisms of pelvic cellulitis, chiefly streptococci, tend to remain viable in the affected tissues for many months, and, sometimes, for several years. Subsidence of acute symptoms and of fever do not necessarily indicate that the disease has become chronic, especially in the presence of cellulitis. The sedimentation rate of erythrocytes seems to be the most accurate index of the degree of infection remaining in the pelvis.

Residual damage present when chronic stage is reached. When inflammation has passed the acute and subacute phases there may be a great variance in the amount of residual damage. The damage to tissue following acute gonorrheal salpingitis will depend to a large extent on the degree of inflammatory reaction and the extent of involvement. As has been stated, when the infection is mild and confined to the fallopian tube there may be complete recovery.

Usually, secondary invaders, streptococci, are responsible for extension of the inflammation to other pelvic structures, especially the cellular tissue. Postgestational or postoperative inflammation of the pelvis is caused chiefly by streptococci, which may remain viable in the tissue for many months.

In a large measure the extent of involvement and the symptoms resulting therefrom will determine the management of the condition. Roughly, 75 per cent of patients with acute gonorrhea will recover if treated conservatively, and about 80 per cent of patients with acute gonorrheal salpingitis will recover sufficiently so that operation is unnecessary.

Treatment. When a woman presents herself with chronic or subchronic pelvic inflammation, the method of treatment to be employed depends on the extent of the tissue involved, the presence or absence of localized collections of pus, and the patient's symptoms and disability.

The criteria to be considered are the disability, the discomfort, and the menstrual function of the patient. While correction of disability and relief of symptoms are evidently the most important, normal menstrual function should be preserved when it is humanly possible, the young woman unsewed may have health but unhappiness.

The majority of patients with chronic pelvic inflammation can be cured or greatly relieved by measures other than operation. These measures are based on three essentials: time, rest, and heat. Various methods have been used to bring heat to the affected areas. Diathermy is of value, but has not seemed to be so effective in bringing heat to the pelvic tissues as the Elliott vaginal heat method. In the Elliott method of treatment, a distensible rubber bag is inserted into the vagina and through it is circulated hot water under regulated conditions of heat and pressure.

It has been said that gonorrhea is responsible for more pelvic conditions necessitating surgical treatment than any other disease. The gonococcus is a surface invader entering the mucosa through an abrasion which may be so slight as to be unnoticed. In favorable cases the infection does not get higher than the cervix where the organism 'burns' itself out sometimes in a comparatively few weeks and usually within a year.

When the protective barrier is dislodged or overcome by coitus, physical activity, overzealous treatment, or menstruation, the organism passes from the cervix into the uterus through which it travels as a surface invader on the endometrium which offers a passageway but not a haven, and thence into the tubes. The accompanying congestion and exudate may produce closure of the fimbria, or the infection may involve the ovary or, locally, the peritoneum.

It is rare for gonorrheal infection to pass through the walls of the fallopian tube. In the lumen of the tube damage occurs from destruction of the mucosa and from the formation of adhesions which may form sacculations in some areas, in others it narrows and may entirely obstruct the lumen. This is a common cause for sterility. One or both ovaries may be involved by a surface infection or a deeper abscess formation. The peritoneum may be more or less involved, and result in local areas of peritonitis or general pelvic peritoneal inflammation. Adhesions may involve the sigmoid, small bowel, uterus and bladder as well as the tubes and ovaries and produce more or less distortion in the normal relationships of the pelvic viscera.

In postabortal or postpartum infections, the predominant organism is the streptococcus which usually spreads by the lymph channels and reaches the cellular tissue in the parametrial areas, in the folds of the broad ligaments and in the tissue overlying the rectum. The fallopian tubes are involved secondarily and from without rather than primarily and from within as in gonorrheal infection.

Prophylactic management. Emphasis may be placed on the precautions which must be taken against the development of postgestational infection or against the upward spread of an acute gonorrheal infection. Mention should be made of the necessity for asepsis in the management of labor and the avoidance of all unnecessary vaginal examinations and operative deliveries. The utmost care must be exercised in cases of induced abortion, especially when it is incomplete or in cases of febrile spontaneous abortion. The introduction of an instrument into the uterus in such a case is apt to disturb the protective barriers and release infection into the lymph or venous channels. In such cases products of conception may be removed from the os cervix but it is unwise to enter the uterus unless dangerous hemorrhage occurs.

In the presence of acute gonorrhea involving the cervix, care must be taken to prevent the extension of the infection beyond the cervix. More harm may be done by overzealous treatment than by no treat-

ment at all. The patient should be warned to avoid physical activity especially during the menses to avoid pressure douches or any douche if the os is patulous to avoid alcoholic drinks and above all to avoid sexual intercourse. The physician will do well to avoid active treatment of the vagina or cervix or manipulation of the pelvic structures which by its trauma or disturbance of the protective barrier may permit the upward passage of the infection. Rest in bed in the Fowler or modified Fowler position, mild laxatives or small enemas taken under special precautions to avoid producing proctitis and a light diet and sedatives as indicated will usually serve to avert salpingitis. In fact cures may be obtained without any other treatment. For many women this type of management is impossible because of economic conditions but even then the treatment should be most gentle, possibly consisting only of the instillation of a mild antiseptic into the vagina until the infection 'cools off'.

Differential diagnosis. There are several acute pelvic and lower abdominal lesions with which acute gonorrheal salpingitis may be confused. Chief among these are acute appendicitis, acute pyelitis, tubal pregnancy, postabortal cellulitis and acute tuberculous salpingitis.

The onset of pelvic symptoms may be sudden as in any of the aforementioned conditions, the pain is pelvic rather than general abdominal and tenderness is bilateral and lower than in acute appendicitis. In the presence of acute salpingitis vaginal examination usually reveals tenderness on movement of the cervix or pressure on the corpus and tenderness and enlargement of the tubes. The history of a missed period followed by persistent slight uterine bleeding, a unilateral tubal mass which is less tender than an inflammatory mass of equal size and a positive biological test for pregnancy will indicate the presence of ectopic pregnancy.

Management of acute gonorrheal salpingitis. This consists essentially of rest in bed, the application of cold or heat to the lower portion of the abdomen, the Fowler position, adequate fluids and later a light diet, mild laxatives or small enemas and little if any active treatment. Bimanual examination of the pelvis if done should be gentle. The acute phase of the disease may be characterized by a high or relatively high fever, sometimes chills, pelvic pain and splinting of the lower abdominal muscles and sometimes distention. When symptoms indicate that there is diffuse pelvic peritoneal involvement or perhaps general peritonitis, opiates are given to check peristalsis and fluids are given intravenously or subcutaneously and not by mouth. Duodenal drainage may be indicated. Surgical treatment of acute pelvic inflammation is contra-indicated unless an abscess forms and 'points' in an area which can be drained without the removal of tissue.

Fever therapy. Improvement sometimes follows the artificial production of fever with its accompanying leucocytosis and acceleration of blood flow. Artificial fever may be induced by the injection of

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Vignocchi, R.: Infraligamentary Extra-Uterine Pregnancy (*Sulla gravidanza extrauterina infraligamentaria*) *Riv ital di ginec*, 1937, 20: 343

The author presents a short review of the literature with special reference to infraligamentary ectopic pregnancy. This type of gestation is important because of the attachment of the placenta directly to the pelvic connective tissue. In this manner, it differs from some forms of intra-abdominal pregnancy in which the placenta is implanted in the tube.

Vignocchi records a report of a twenty-nine-year-old patient who had passed through a previous normal pregnancy and labor in 1927. Amenorrhea occurred again beginning March 27, 1936, and was soon followed by the subjective symptoms of pregnancy. At the end of May she visited a physician because of pain in the right iliac region accompanied by fever, vomiting, and some vertigo. After rest in bed for a few days she was well again except for a dull ache on the right side. Early in July there was a repetition of the symptoms with relief after rest. Her physician believed that she was suffering with a spastic colon. About the middle of July the patient believed that she felt fetal movements. On August 12 a slight discharge of blood from the vagina began and continued for fifteen days. About September 1 fetal movements stopped. She consulted the doctor about the middle of September because of the continued lack of fetal movements.

Physical examination revealed a somewhat tender abdomen in all portions. There was a mass projecting upward from the pelvis, especially on the right side, and reaching the umbilicus. It was rounded, firm, only slightly movable, and slightly tender. Otherwise the general findings were normal. Gynecological examination revealed the multiparous type of external genitalia without the characteristics of existing pregnancy. There was no bloody flow. The cervix and body of the uterus seemed normal. The left adnexa were normal. On the right side the mass, felt abdominally, seemed to be attached. The firm rounded structure felt like the head of a fetus.

At operation this mass was found to be somewhat adherent to the small intestines and omentum. These adhesions were freed and the entire mass, with the attached ovary, tube, and portion of the broad ligament was removed. The entire mass weighed 700 gm. The author gives a very detailed description of the gross and microscopic pathology of the specimen. The entire ovarian cavity was contained between the leaves of the broad ligament, and the placenta was in contact with the loose connective tissue of the pelvis.

The development of such infraligamentary ectopic gestation is probably secondary to a ruptured tubal

pregnancy which was situated precisely at the junction of the tube and the broad ligament.

A. Louis Rosi, M.D.

Keller, R., and Fournier, R.: The Different Forms of Premature Separation of the Normally Implanted Placenta from a Clinical and Therapeutic Point of View (*Les différentes formes de décollements prématurés du placenta normalement inséré au point de vue clinique et thérapeutique*) *Gynécologie*, 1937, 36: 449.

Uteroplacental apoplexy, according to the authors, is an anatomicoclinical syndrome which manifests itself clinically by the abrupt appearance of uteroplacental hemorrhage and disturbed uterine contractility. The salient characteristics are the anatomical lesions involving the uterus and its adnexa. The symptomatology, on the other hand, is by no means so definite and does not differ greatly whether uterine lesions are present or whether the case involves merely retroplacental hemorrhage. Therefore, the diagnosis of uteroplacental apoplexy can be made with certainty only when surgical treatment (cesarean section or hysterectomy) is instituted.

The authors discuss the different views concerning the pathogenesis of uteroplacental apoplexy: trauma, toxemia, and endometritis. They insist that classifications of these cases should be based not upon such supposed causes, but rather upon clinical severity. Accordingly, they have grouped their series of 27 cases, occurring in their service over a period of seventeen years with an incidence of 1.06 per cent, in the following categories: (1) mild types, and (2) severe types. The latter group is divided into cases which are serious because of hemorrhage, and those which are serious because of associated toxemia (eclampsia and pre-eclampsia). The total mortality in their series was maternal, 11.1 per cent, and fetal, 81.5 per cent. The entire maternal mortality occurred in the severe types. The authors give detailed accounts, with appended case reports, of the various therapeutic procedures carried out and the clinical features noted in the different groups outlined above.

Of particular interest in this discussion are the views presented by the authors in summarizing their experiences.

1. Hemorrhage is the outstanding clinical finding in premature placental separation. It is most often the first clinical indication of this disorder. In mild types the bleeding is difficult to distinguish from that seen in placenta previa. Two-thirds of their patients showed external bleeding as the initial symptom. Moreover, they noted that severe external bleeding was seldom associated with toxic signs, and *vice versa*. Board-like rigidity of the uterus, contrary to general opinion, is not a constant

Pandall stated that proper distention of the bag is of primary importance because the area of heat dissemination depends on a sufficient volume of water as well as the proper heat of the water. Proper distention of the bag may be noted on the gauge of the machine and also the palpating finger in the vagina or rectum can determine whether proper distention is obtained. In a recent paper he and Krusen said that in observing more than 4,000 vaginal heat treatments at the Mayo clinic the average pressure employed was 2 1/2 pounds, and the average temperature 127° F.

In some cases of pelvic cellulitis the use of a rectal bag is more effective than the vaginal applicator. It is particularly of value when the vaginal application is impractical, the broad ligaments are fixed or the lesion is beyond effective reach of the vaginal bag. The rectal bag is not used in gonorrheal infection.

In considering the results of treatment cases of chronic infection reported by these authors were divided into two groups: proved gonorrheal infections and infections of a non-specific nature. Forty-three patients with chronic gonorrheal infection were treated by the Elliott method and by topical applications to the urethra or cervix, or both. One hundred and seventy-three patients with chronic non-specific pelvic inflammatory disease were given the Elliott vaginal treatment.

In these groups chronic parametritis or chronic cellulitis responded more slowly to treatment than chronic salpingo-ovariitis. The response of tubo-ovarian abscess was poor and a large percentage of patients had to be operated on.

The effects of the use of sulphanilamide for this and other conditions indicate the necessity for care in administration because of occasional symptoms of lassitude or cyanosis or the appearance of fever, hepatic enlargement, jaundice, sulphhemoglobinemia or evidence of destruction of erythrocytes. Saline cathartics are contra-indicated and apparently the drug is more effective if fluid intake is limited.

SURGICAL TREATMENT

Acute pelvic inflammations. Operative measures for acute pelvic inflammatory disease should consist only of drainage of collections of pus, which point in such locations that destruction of tissue is unnecessary.

Chronic pelvic inflammations. Surgical treatment of chronic pelvic inflammation may be the method of choice for disabling pain or other symptoms resulting from damage to the tissues when the condition has failed to respond to conservative measures carried out over an adequate period of time. Cases of equal degree of pelvic disease, chronic discomfort and disability in two patients, one of whom has means of support and the other of whom must earn her livelihood by physical work, operation might have to be done sooner in the latter case than in the former.

Operations may be done for the removal of irreparably damaged tissues producing disability, or in an attempt to restore normal function. Conservation of the menstrual function is desirable. Following complete subsidence of the original inflammation operations may be necessary for the relief of symptoms in such cases, for instance, as adherent retroversion, adherent prolapsed ovaries, dyspareunia, intestinal obstruction or sigmoid dysfunction causing painful defecation. The failure of some operations to relieve the symptoms of which the patient complains should make the surgeon cautious in performing operation on patients in whom sufficient tangible evidence for the symptoms is not revealed by careful search.

It is not within the scope of these remarks to outline the technique or methods of operation. It may be well to state, however, that operations for pelvic inflammatory disease are apparently made easier as a result of softening the adhesions and lines of cleavage in those cases in which the operation is performed after a course of fairly prolonged pelvic heat treatment.



Fourteen of the 34 children died, 11 of the deaths were due to injury to the skull or cervical spine. The child is particularly endangered in cases of contracted pelvis. In the great majority of the cases of death of the child it was the Viennese School forceps that was used. The high forceps operation is an emergency measure, which in certain rare cases has justified itself. For improvement of the results it is particularly important that careful consideration be paid to the presence of contracted pelvis. From a technical standpoint the Kielland forceps has shown itself indubitably superior to the Viennese School forceps.

(HANS HEIDLER) FLORENCE A. CARPENTER.

Erbslooh, J : Unsuccessful Attempts at Forceps Delivery In and Outside of the Clinic (Ueber den vergleichenden Zangenversuch inner- und ausserhalb der Klinik.) *Monatsschr f Geburtsh u Gynaek*, 1937, 105 257

The author reports 48 cases of unsuccessful forceps delivery observed over a period of ten years in the course of 20,000 deliveries. In 33 instances forceps delivery had been attempted at the home of the patient prior to her admission to the hospital. It is noteworthy that there were only 18 primiparas as compared to 15 multiparas in the group.

It was also observed that forceps attempts failed much more frequently the earlier in the course of labor the attempt was made. Forceps failure is rare when the head is on the pelvic floor, also when the head is in the mid-pelvis, failures occur most often when the head is still movable.

The author discusses a series of cases with faulty diagnoses and hence improper indications. The results of high forceps deliveries were extremely poor for both mother and child. In many instances, oxytocic drugs were used without reason and repeatedly, 6 fetal deaths are attributed to this cause.

Cases of unsuccessful forceps delivery which occur in the hospital, i.e., high forceps deliveries, are always cases in which cesarean section is contra-indicated, hence, a high fetal mortality (60 per cent) is always to be expected.

(E. ZWIFEL) HAROLD C. MACK, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Block, E.: Manual Detachment of the Placenta and Intra-Uterine Post-Partum Revision. A Clinicostatistical Study (Ueber manuelle Loesung der Placenta und intrauterine Revision post partum. Eine klinisch-statistische Studie.) *Acta obst et gynec Scand*, 1937, 17 342

Opinions are about equally divided as to the dangers of and certain indications for manual detachment of the placenta. Among 50,545 deliveries at the Gothenburg Maternity Hospital, the cases of manual detachment of the placenta amounted to 0.76 per cent. The figures in the literature vary between 0.51 and 3.25 per cent.

Among 386 cases of manual detachment of the placenta or its remains, there were 14 (3.6 per cent) primary fatalities. Six fatalities resulted from hemorrhage and may be deducted. In the remaining 8 cases the cause of death was infection, but in no case could a genital origin be excluded. The corrected mortality was 2.1 per cent. Of these 8 fatalities from infection, 6 were due to puerperal sepsis, the remainder were due to pneumonia and pulmonary embolism, probably not of genital origin. This brings the mortality down to 1.6 per cent. Only in 2 cases could the fatality be definitely attributed to manual detachment. This gives an adequate estimate of the danger associated with intra-uterine manipulations after delivery.

In the literature, the morbidity figures vary between 20 and 80 per cent, because some authors cite the total morbidity, and others the corrected morbidity. Under "corrected morbidity" are included: (1) septic cases, in which a genital source of infection cannot be excluded, (2) cases of thrombosis, and (3) cases of resorption fever during the puerperium. The author also includes non-acute cases of hemorrhage, urinary tract infection, and infection of the upper respiratory tract and breasts. Of the 386 cases, 130 showed complications in the puerperium, a total morbidity of 33.7 per cent. In the corrected mortality of 25.4 per cent, 32 cases were not included. There is a distinct tendency toward an increased frequency of genital puerperal infections.

In this series of 386 cases of manual detachment of the placenta, the entire placenta was removed in 267 cases, and placental remains were removed in 119. It was found that the detachment of the entire placenta is associated with a much greater danger of puerperal complications than detachment of placental remains. All of the fatalities occurred in the former group. The corrected mortality amounted to 2.6 per cent. Manual separation of the placenta is not a relatively innocent intervention, however, after manual detachment of placental remains the mortality is nil and the morbidity is 11.8 per cent, the latter is therefore a fairly harmless intervention.

An absolute indication for the earliest possible removal of the retained placenta is the amount of blood lost, regardless of the time since the delivery. The removal should be done prophylactically and not after a marked loss of blood. Late interventions contribute to the high mortality formerly seen. With a loss of 500 c cm of blood, manual removal of the placenta is to be considered. In cases of placental retention without serious blood loss (less than 500 c cm) the time of intervention is still under dispute, after about two hours is considered the proper time. In infected cases, the removal should be done earlier. Other measures should be tried before resorting to manual removal. The author classifies the cases of hemorrhage into two groups. (1) those with a loss of 500 c cm of blood or more, and (2) those with a loss of less than 500 c cm. With placental retention in the first group, the blood loss greatly increases the danger of serious complications, there-

finding it was present in only one half of the patients regardless of the grade of severity or extent of the hemorrhage.

2 Contraction of the uterus contrary also to common opinion is not unusually painful. Sensitivity of the uterus to palpation on the other hand, is almost certain evidence of uteroplacental apoplexy. This symptom merits greater attention in their opinion and is of value in dictating the choice of treatment.

3 Associated signs of toxemia (hypertension albuminuria) are not signs of abruptio placentae *per se* but rather signs of pregnancy toxemia which frequently accompanies this condition. The fact that abruptio is rare while toxemia is frequent makes the authors inclined to deny a causal relationship between these states certainly as far as the hypertensive factor is concerned.

In summarizing their therapeutic views the authors state a strong case for conservative i.e. non surgical methods. In mild types normal vaginal delivery is always possible. Vaginal hysterectomy is indicated in exceptional cases when dilatation is slow. Fetal indications alone will occasionally justify more rapid methods of vaginal delivery. Abdominal delivery for the sake of the child as in elderly primiparas is justifiable if the added risk to the mother is desired or if some additional complication such as contracted pelvis makes successful vaginal delivery doubtful. The uterus should be retained if it contracts well which in the opinion of the authors is almost always the case.

In severe varieties menaced by profuse hemorrhage or toxemia or both no fixed line of treatment can be laid down. When hemorrhage is the predominating feature rupture of the membranes generally stops bleeding and expedites labor. Once stopped hemorrhage rarely recurs during labor. Delivery by low forceps and breech extraction is justified as soon as dilatation is complete. The post partum danger is chiefly atonic bleeding rather than toxic absorption from the Coeloclaire uterus claimed by Riviere. Oxytocic drugs should be used freely. The authors in instances of post partum bleeding earnestly commend manual revision of the uterus. Removal of blood clots aids in stimulating contractions and frees the uterus of potential sites for infection. As a final resort tamponade can be relied upon for good results. This mode of treatment has given the authors better results than have surgical methods.

When toxemia other than eclampsia complicates the hemorrhage the choice of therapy is difficult. Abdominal delivery is justified if the patient is seen early if the fetus is alive and viable if the symptoms are rapidly progressive and if labor does not begin. Expectancy on the other hand gives excellent results in these cases particularly with the help of blood transfusions. Even these severe types have responded better to conservative measures in the authors experience.

When eclampsia is associated the authors consider uteroplacental apoplexy the lesser of the two evils. Treatment in such instances is directed toward the eclampsia with punction given intravenously by the Stroganoff method. Methods to hasten delivery may be employed secondarily. The authors indicate their complete satisfaction with this form of therapy. Surgical treatment would be unthinkable in such cases.

Generally speaking the uterus in all varieties of cases of apoplexy contracts well. The danger of toxic resorption from an apoplectic uterus is denied by the authors. Hysterectomy may be indicated under rare conditions when (1) infiltration and edema of the uterus and peritoneum are very extensive (2) when atony persists despite oxytocic measures (3) when there is severe toxemia and (4) as a last resort in uncontrollable post partum bleeding a condition which the authors have never observed. Criteria for hysterectomy advanced by other authors would have necessitated the needless sacrifice of the uterus in 5 of their cases which were delivered successfully by means of conservative measures.

Follow up studies on their patients delivered by obstetrical methods showed 16 subsequent pregnancies with 13 terminating successfully at term. Premature separation of the placenta did not occur in any of the ensuing pregnancies.

HAROLD C. MACE, M.D.

LABOR AND ITS COMPLICATIONS

Bruecke H. von. High Forceps Operations (Lehrbuch der Zangenoperationen). *Arch. f. Gyn.* 1913, 164, 47.

The author reports on 34 high forceps operations carried out among a total of 18,611 deliveries at the Graz University Women's Clinic in a period of nearly ten years. In this period forceps were used in 2.01 per cent of all deliveries and the high forceps operation in 0.28 per cent. Emphasis is laid on the importance of a suitable preparation of the soft parts by a sufficiently large vaginoperineal incision and if needed by hysterostomy. The Viennese School forceps was used in 24 of the 34 cases, the Kielland forceps in 10. There was no maternal death in the series. In 5 cases there were extensive tears of the vagina and perineum. In 2 cases there was injury to the bladder, one case of pressure necrosis and one case of tear of the bladder. In both of these cases the fistulas healed spontaneously.

The anterior spoon of the Kielland forceps was usually rotated in accordance with the original instructions of Kielland. Sometimes it was held loosely and allowed to take its own course. In a few cases Bruecke applied the anterior spoon directly and in one of these cases the hand of the child slipped through the window in the forceps and prevented extraction. The child died and perforation had to be done. This case however is not included in this series.

Fourteen of the 34 children died, 11 of the deaths were due to injury to the skull or cervical spine. The child is particularly endangered in cases of contracted pelvis. In the great majority of the cases of death of the child it was the Viennese School forceps that was used. The high forceps operation is an emergency measure, which in certain rare cases has justified itself. For improvement of the results it is particularly important that careful consideration be paid to the presence of contracted pelvis. From a technical standpoint the Kielland forceps has shown itself indubitably superior to the Viennese School forceps.

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(E. ZWETTEL) HAROLD C MACK, M D

PUERPERIUM AND ITS COMPLICATIONS

Block, E.: Manual Detachment of the Placenta and Intra-Uterine Post-Partum Revision: A Clinicostatistical Study (Ueber manuelle Loesung der Placenta und intrauterine Revision post partum. Eine klinisch-statistische Studie.) *Acta obst et gynec Scand*, 1937, 17 342

Opinions are about equally divided as to the dangers of and certain indications for manual detachment of the placenta. Among 50,545 deliveries at the Gothenburg Maternity Hospital, the cases of manual detachment of the placenta amounted to 0.76 per cent. The figures in the literature vary between 0.51 and 3.25 per cent.

Among 386 cases of manual detachment of the placenta or its remains, there were 14 (3.6 per cent) primary fatalities. Six fatalities resulted from hemorrhage and may be deducted. In the remaining 8 cases the cause of death was infection, but in no case could a genital origin be excluded. The corrected mortality was 2.1 per cent. Of these 8 fatalities from infection, 6 were due to puerperal sepsis, the remainder were due to pneumonia and pulmonary embolism, probably not of genital origin. This brings the mortality down to 1.6 per cent. Only in 2 cases could the fatality be definitely attributed to manual detachment. This gives an adequate estimate of the danger associated with intra-uterine manipulations after delivery.

In the literature, the morbidity figures vary between 20 and 80 per cent, because some authors cite the total morbidity, and others the corrected morbidity. Under "corrected morbidity" are included: (1) septic cases, in which a genital source of infection cannot be excluded, (2) cases of thrombosis, and (3) cases of resorption fever during the puerperium. The author also includes non-acute cases of hemorrhage, urinary tract infection, and infection of the upper respiratory tract and breasts. Of the 386 cases, 130 showed complications in the puerperium, a total morbidity of 33.7 per cent. In the corrected mortality of 25.4 per cent, 32 cases were not included. There is a distinct tendency toward an increased frequency of genital puerperal infections.

In this series of 386 cases of manual detachment of the placenta, the entire placenta was removed in 267 cases, and placental remains were removed in 119. It was found that the detachment of the entire placenta is associated with a much greater danger of puerperal complications than detachment of placental remains. All of the fatalities occurred in the former group. The corrected mortality amounted to 2.6 per cent. Manual separation of the placenta is not a relatively innocent intervention, however, after manual detachment of placental remains the mortality is nil and the morbidity is 11.8 per cent, the latter is therefore a fairly harmless intervention.

An absolute indication for the earliest possible removal of the retained placenta is the amount of blood lost, regardless of the time since the delivery. The removal should be done prophylactically and not after a marked loss of blood. Late interventions contribute to the high mortality formerly seen. With a loss of 500 c cm of blood, manual removal of the placenta is to be considered. In cases of placental retention without serious blood loss (less than 500 c cm) the time of intervention is still under dispute, after about two hours is considered the proper time. In infected cases, the removal should be done earlier. Other measures should be tried before resorting to manual removal. The author classifies the cases of hemorrhage into two groups: (1) those with a loss of 500 c cm of blood or more, and (2) those with a loss of less than 500 c cm. With placental retention in the first group, the blood loss greatly increases the danger of serious complications, there-

finding, it was present in only one half of the patients regardless of the grade of severity or extent of the hemorrhage.

2 Contraction of the uterus contrary also to common opinion is not unusually painful. Sensitivity of the uterus to palpation on the other hand, is almost certain evidence of uteroplacental apoplexy. This symptom merits greater attention in their opinion, and is of value in dictating the choice of treatment.

3 Associated signs of toxemia (hypertension, albuminuria) are not signs of abruptio placentae per se but rather signs of pregnancy toxemia which frequently accompanies this condition. The fact that abruptio is rare while toxemia is frequent makes the authors inclined to deny a causal relationship between these states certainly as far as the hypertensive factor is concerned.

In summarizing their therapeutic views the authors state a strong case for conservative i.e. non-surgical methods. In mild types, normal vaginal delivery is always possible. Vaginal hysterotomy is indicated in exceptional cases when dilatation is slow. Fetal indications alone will occasionally justify more rapid methods of vaginal delivery. Abdominal delivery for the sake of the child as in elderly primiparas is justifiable if the added risk to the mother is desired or if some additional complication such as contracted pelvis makes successful vaginal delivery doubtful. The uterus should be retained if it contracts well which, in the opinion of the authors is almost always the case.

In severe varieties, menaced by profuse hemorrhage or toxemia or both no fixed line of treatment can be laid down. When hemorrhage is the predominating feature, rupture of the membranes generally stops bleeding and expedites labor. Once stopped hemorrhage rarely recurs during labor. Delivery by low forceps and breech extraction is justified as soon as dilatation is complete. The post-partum danger is chiefly atonic bleeding, rather than toxic abruption from the Couvelaire uterus claimed by Riviere. Oxytocic drugs should be used freely. The authors, in instances of post-partum bleeding, earnestly commend manual revision of the uterus. Removal of blood clots aids in stimulating contractions and frees the uterus of potential sites for infection. As a final resort tamponade can be relied upon for good results. This mode of treatment has given the authors better results than have surgical methods.

When toxemia other than eclampsia complicates the hemorrhage the choice of therapy is difficult. Abdominal delivery is justified if the patient is seen early if the fetus is alive and viable if the symptoms are rapidly progressive and if labor does not begin. Expectancy on the other hand gives excellent results in these cases particularly with the help of blood transfusions. Even these severe types have responded better to conservative measures in the authors experience.

When eclampsia is associated the authors consider uteroplacental apoplexy the lesser of the two evils. Treatment in such instances is directed toward the eclampsia with pernocton given intravenously by the Suroganoff method. Methods to hasten delivery may be employed secondarily. The authors indicate their complete satisfaction with this form of therapy. Surgical treatment would be unthinkable in such cases.

Generally speaking the uterus in all varieties of cases of apoplexy contracts well. The danger of toxic resorption from an apoplectic uterus is denied by the authors. Hysterectomy may be indicated under rare conditions when (1) infiltration and edema of the uterus and peritoneum are very extensive, (2) when atony persists despite oxytocic measures, (3) when there is severe toxemia and (4) as a last resort in uncontrollable post-partum bleeding a condition which the authors have never observed. Criteria for hysterectomy advanced by other authors would have necessitated the needless sacrifice of the uterus in 5 of their cases which were delivered successfully by means of conservative measures.

Follow up studies on their patients delivered by obstetrical methods showed 16 subsequent pregnancies with 13 terminating successfully at term. Premature separation of the placenta did not occur in any of the ensuing pregnancies.

ROBERT C. MACK, M.D.

LABOR AND ITS COMPLICATIONS

Brucke H von High Forceps Operations (Ueber hohe Zangenoperationen) Arch f Gyn 193
104 42

The author reports on 34 high forceps operations carried out among a total of 28 611 deliveries at the Graz University Women's Clinic in a period of nearly ten years. In this period forceps were used in 2.01 per cent of all deliveries and the high forceps operation in 0.18 per cent. Emphasis is laid on the importance of a suitable preparation of the soft parts by a sufficiently large vaginal perineal incision and if need be by hysterotomy. The Viennese School forceps was used in 24 of the 34 cases. The Kielland forceps in 10. There was no maternal death in the cases. In 5 cases there were extensive tears of the vagina and perineum. In 2 cases there was injury to the bladder, one case of pressure necrosis and one case of tear of the bladder. In both of these cases the fistulas healed spontaneously.

The anterior spoon of the Kielland forceps was usually rotated in accordance with the original instructions of Kielland. Sometimes it was held loosely and allowed to take its own course. In a few cases Brucke applied the anterior spoon directly, and in one of these cases the head of the child slipped through the window in the forceps and prevented extraction. The child died and perforation had to be done. This case however is not included in this series.

GENITO-URINARY SURGERY

GENITAL ORGANS

Plaggemeyer, H. W., and Weltman, C. G.: The Limitations of Transurethral Resection of the Prostate Gland *J Urol*, 1937, 38 389

The author reviews the work of early resectionists and emphasizes the need for the evaluation of each case. He urges the use of a large caliber resectoscope only until enough tissue is removed that the smaller sheath may be introduced and manipulated. He states that rapid work and the absence of trauma are cardinal points in operative technique, and lists the following factors as probable contra-indications. (1) large extravascular prostates, (2) large intravesical prostates extending backward under the trigone in an embarrassing proximity to the ureteral orifice, (3) deeply imbedded prostatic calculi, (4) large vesical calculi, with a foully infected bladder, (5) dependent diverticula of the bladder, (6) patients in the early fifties, with a mild, diffuse infection, and with possible beginning adenoma, and (7) cases with an improper chloride output. The limitations of the operation lie within the limitations of the man behind the resectoscope. DONALD K. HIBBS, M.D.

Turner, G. G.: Imperfect Migration of the Testicle: The Surgical Problem *Proc Roy Soc Med*, Lond., 1937, 30 1319

The author discusses the pre-operative consideration of the patient as well as his technique and results. He divides the cases of bilateral undescended testicles into two groups, namely, those which apparently lack an endocrine stimulus, and those in which mechanical assistance may supplement or even replace the former. He believes that symptoms attributed to the undescended testicle are often exaggerated, but an undescended testicle is more liable to torsion than the normally placed organ. He believes in giving hormonal treatment a twelve-month trial period. Unilateral cases as a rule are an easier problem either for orchiopexy or castration. The essential part of the operative technique is the thorough mobilization of the cord above the internal ring. As a rule, the author fixes the implanted testicle to the thigh for from three to six months.

DONALD K. HIBBS, M.D.

Henry, S. A.: The Study of Fatal Cases of Cancer of the Scrotum from 1911 to 1935 in Relation to Occupation, with Special Reference to Chimney Sweeping and Cotton Mule Spinning. *Am. J. Cancer*, 1937, 31 28

The author makes a further study of the relation of cancer of the scrotum to occupation, with special reference to confirmation or correction of the pathological nature of the primary site of the growth, and the nature of the occupation of each of 1,487 males who died of the disease between 1911 and 1935.

In the majority of cases the occupation given on the death certificate is probably the important one and frequently suggests a cause for the disease, such as mineral oil, soot, tar, or pitch in the case of cotton mule spinners, chimney sweeps, tar workers, and patent fuel workers, respectively, however, there are certain cases in which the occupation stated gives no such indication. A subsequent investigation of a number of the latter has revealed the fact that the occupation mentioned was only a recent one, and has elicited a history of earlier employment of many years' duration in which there was contact with a known carcinogenic agent.

The number of fatal cases recorded as cancer of the scrotum by the Registrar General for England and Wales between 1911 and 1935 is 1,487, the disease being defined as epithelioma in 903 cases, carcinoma in 362, cancer in 206, rodent ulcer in 3, sarcoma in 12, and teratoma in 1 case. The figure does not include 94 cases of malignant disease of the "penis and scrotum," which are recorded under cancer of the penis by the Registrar General, but includes 22 cases of malignant disease of the "scrotum and penis." However, investigation of some of both sets of cases suggests that the site first stated may not invariably be the primary one. Neither are there included 35 cases of malignant disease of the "genitals," which are recorded under cancer of the penis, or 131 cases of cancer of the inguinal or iliac lymph nodes.

The tabulation summarizes the comparative results of the present study of fatal cases of cancer of the scrotum and of other cutaneous sites in chimney sweeps and cotton mule spinners. In chimney sweeps there is a slight reduction in the actual number of fatal cases of cancer of the scrotum between the first and last quinquennial periods, but the number of sweeps at risk is equivalently reduced. There is an increase in the number of fatal cases of cutaneous cancer at other sites than the scrotum, but the figures for all cutaneous cases are the same in the first as in the last quinquennial period. The crude death rate for cancer of the scrotum for the number of sweeps at risk is 620 per 1,000,000, and was the same for the first as it was for the last quinquennial period, it is now 98.4 times higher than that for the general population.

In cotton mule spinners there is a marked increase in the number of fatal cases of cancer of the scrotum, from 40 in the first quinquennial period to 92 in the fourth quinquennial period, falling to 80 in the fifth quinquennial period, though the number was still double that in the first. There has been an increase in the number of fatal cases of cancer on cutaneous sites other than the scrotum, but this increase is less marked than that for cancer of the scrotum. The crude death rate for cancer of the scrotum for the number of cotton mule spinners at risk was at least 190 per 1,000,000 in the first and at least 480 per

fore prophylactic therapy is of great importance. The blood loss should be measured. This applies particularly to infected cases. In the second group, the time of intervention is of no serious import in clean cases. In these the danger of serious puerperal complications is slight in spontaneous deliveries, but not insignificant after operations for delivery, and re-erye is indicated for manual intervention. Infected cases do not demand the earliest possible manual removal.

In clean cases the morbidity and mortality were 7.1 and 2.4 per cent, respectively, in infected cases the morbidity was 75.9 per cent and the mortality 6.9 per cent. These figures show a considerably worse prognosis for infected cases. The danger of complications from manual displacement after delivery operations is considerably greater than after spontaneous deliveries.

The author divides the cases of delivery operations into two groups: (1) those with placental retention in which the usual lines of therapy were followed and (2) those in which the placenta was removed immediately after delivery. In none of the cases in the second group were there any serious puerperal complications. Most of the complications occurred in the first group in which weak labor pains were the indication for operative intervention. Placental expression procedures should be done before resorting to manual removal unless a hemorrhage threatening life makes immediate intervention necessary.

With Credé placental expression under anesthesia there were failures in 99 cases and successful results in 27 cases (21.4 per cent). This procedure was done successfully in 17.6 per cent of the operative cases and in 22.8 per cent of the normal deliveries. Placental expression is usually a harmless procedure, but may be dangerous in cases with severe hemorrhage in which delay might be serious, in cases with placental remains resulting in loss of an amount of blood threatening to life, in infection and in uterine neoplasm formation such as a placental polyp or chorioepithelioma. With intra uterine exploration early and before the loss of blood has become too great there is only a slight danger of puerperal complications from placental remains.

Intra uterine explorations were done only in 5 (13.5 per cent) of 27 expressions under anesthesia. The dangers are the same even without anesthesia.

In all of the 119 cases of retained placental remains cited the intra uterine revision was done shortly after delivery either because a developing hemorrhage suggested that there were placental remains in the uterus or because the placenta was found defective. The results were the same as with manual displacement of the entire placenta. Bleeding cases show a higher morbidity than non bleeding cases and operative cases a higher morbidity than spontaneous deliveries. LOUIS NEWELL, M.D.

NEWBORN

Harrar, J. A. Worth While Surgery in the Newborn. *Am J Obst & Gynec* 1937 34 661

Certain children are born with developmental somatic abnormalities and others with birth trauma. Many of the conditions are, of course, incompatible with survival and some which are temporarily amenable to operative treatment subsequently prove to be virtually hopeless. However, in certain deformities and injuries prompt, performed operation is imperative and life saving, while in certain other conditions treatment could and should be initiated by the obstetrician during the neonatal period.

The author's conclusions are as follows:

1. Operations are of value in imperforate anus, amniotic hernia and hernia into the cord, supernumerary digits, phimosia and tongue tie.
2. Early treatment is important in brachial birth palsy, fracture of the long bones, depression of the skull, forceps blade pressure marks and the deformity of talipes or clubfoot.
3. Operations are unnecessary in cephalhematoma and engorged breasts.
4. Both operation and treatment are indicated later in undescended testicle, harelip and cleft palate, hydrocele and inguinal hernia, pyloric stenosis and ectrophy of the bladder.
5. Operations are practically useless in patent ductus and tracheo-esophageal fistula.

EDWARD L. CORNELL, M.D.

ditions of the urinary tract Thomas and Wang think that methylene blue is not so inert as many hold it to be, they state that they have found it to be bactericidal even in comparatively high dilution. They emphasize, nevertheless, its irritating effect on both the digestive and the urinary systems.

The first experimental work with acriflavine was done by Browning and Gulbransen in 1917. Their work was concerned with intravenous injections of this dye, and was undertaken with a view to conferring bactericidal properties on the blood. They then found also that if acriflavine was administered by way of the alimentary system it was absorbed, and that in either case the urine soon exhibited the canary yellow fluorescence that is so characteristic of acridine compounds. Edwin Davis substituted neutral acriflavine for the original flavine, the substituted drug being neutral in reaction and capable of being used in higher concentrations. Its antiseptic action begins within two hours after oral administration and lasts for at least eight hours. Unlike most of the other urinary antiseptics, its action is more pronounced when the urine is alkaline. In the author's clinic, it has not been of any real value in gonorrhea, but it has helped to clear up the urine in renal and vesical infections in about 50 per cent of the cases. In nearly all cases there were disagreeable gastro-intestinal disturbances if treatment was kept up for any length of time, and this was equally true when sodium bicarbonate was administered with it.

Regarding pyridium and azo dye therapy, the author states that on the whole these dyes have been found to be a most valuable adjunct in the majority of the cases in which they were used, but that sometimes they failed utterly, and proved the truth that there is no single bactericide that will destroy all bacteria in the urinary tract. He found their sphere of usefulness a wide one, because of the fact that they work equally well in an acid and an alkaline medium. They require no special dietary regimen. About 33 per cent of answers received to a questionnaire stated that pyridium and the rest of the azo dyes seemed to be of no material benefit, 46 per cent stated that they were definitely of value; 21 per cent had never tried them. All in all, however, it would appear that these substances constitute valuable stepping stones in the path of progressive urological therapy.

The chief sponsor for hexylresorcinol (a product of synthetic chemistry) was Veader Leonard, who gave a minute description of its properties in 1924. According to his statement, it meets all the experimental qualities enumerated by Davis as essential to the ideal urinary antiseptic in the following manner: It is chemically stable, non-toxic in therapeutic doses, non-irritating to the urinary tract, bactericidal in high dilution in urine of any reaction, and is excreted by the kidneys unchanged and in sufficient percentage to impart active bactericidal properties to the urine. Results obtained by Leonard up to the date of his writing seemed to justify the claim that in

chronic infections of the urinary tract in adults which are due to staphylococcus albus and aureus and some strains of bacillus pyocyaneus, oral administration of hexylresorcinol without any other treatment has resulted in prompt and complete disinfection of the urinary tract, accompanied by clearing up of the urine and disappearance of symptoms. In colon-bacillus infections, more persistent treatment is usually necessary and, as a rule, local treatment will be found necessary, as well as intensive courses of the drug. There was, according to Leonard, increasing evidence that in cases in which this complete disinfection of the urinary tract did not occur, pyelonephritis was present.

Five and a half years ago Clark, and also Helmholtz, working independently, tried for the first time the effect of acidification of the urine by feeding a special type of high fat, low carbohydrate diet, designed to produce a state of ketosis. The ketogenic diet in its original form was very elaborate and was so exacting in the precision of its minutest details that it was quite unsuited for practical use at home. It had, therefore, the disadvantage of requiring hospitalization of patients who were otherwise not in need of hospital care. On account of the marked gastro-intestinal disturbances caused by the ketogenic diet, it became increasingly difficult to persuade patients to take it. In view of the larger percentage of elderly patients with urosepsis and with established gastro-intestinal disorders, the problem was far from being solved by the ketogenic diet which seemed at best a clumsy, roundabout way of producing a high degree of acidity that might be achieved in some other way. Attempts to find this better way, therefore, were continued.

Two years ago Rosenheim announced his discovery that mandelic acid would do in a direct way what had been done in an indirect and complicated way with beta-hydroxybutyric acid and the ketogenic diet. He recommended that it be given in the form of a salt, such as sodium or ammonium mandelate. This treatment has a tremendous advantage over the ketogenic diet in that the patient may eat whatever he likes, and it has achieved very wide usage because of its incontestable bactericidal potency. In placing mandelic acid in the hands of the medical profession, Rosenheim postulated that its use was effective only in cases unassociated with urinary obstruction.

Helmholtz recently made observations with sulphamylamide which demonstrate that urine of patients taking the drug develops definite bactericidal power for such organisms as are commonly found in infections of the urinary tract. Dees and Colston were the first to record their experiences with sulphamylamide in the treatment of gonococcal infections. In 19 cases observed, the smears and urines became negative for gonococci in two days in 5 cases, in three days in 5 cases, in five days in 2 cases, and in four, six, and twenty-three days, respectively, in single cases. All patients received, in 4 divided doses a day, 4 gm of sulphamylamide daily for two days,

1 000 000 in the last quinquennial period, and is now at least 76 2 times higher than that for the general population

Cotton mule spinning has arrived at a very interesting period, approximately eighty six years after the possible or at any rate limited introduction of a certain carcinogenic agent into the trade or more probably over sixty years after its extensive introduction. It must be noted that, for reasons which did not include prevention of the disease a gradual change from a potent carcinogenic agent to one less potent may have been introduced many years ago at least in certain mills or certain districts and this while complicating the study may offer one explanation of certain facts which at present are not clear as for instance why the annual number of cases would appear to have commenced to decrease.

It is of importance to go into minute detail and avoid surmise not only in dealing with experiments on animals but also in observing the results of certain carcinogenic agents in man for some sixty or eighty years in the case of cotton mule spinners and for a much longer period in the case of chimney sweeps.

In dealing with the effect of a carcinogenic agent on the human being one must bear in mind that if certain individuals while not completely resistant yet are capable of resisting a particular carcinogenic agent for sixty or seventy years after the first date of contact with it even though its application has ceased for some time, such individuals cannot be expected to show signs of the disease until well over the age of sixty seventy or eighty. Even then they may never appear on the cancer death list if treatment is early and successful or may appear on it only years later when treatment for a second or subsequent primary growth has proved unsuccessful. Early treatment may also be successful in patients with an early manifestation of the disease.

Any preventive measures which have been or will be taken with reference to the methods of use or removal of any carcinogenic agent concerned should materially reduce the incidence of the disease however these must not be expected to produce an immediate dramatic decrease for it is now clear that even if contact with the causal agent ceases, the disease unfortunately may manifest itself in years to come provided the period of contact has already been sufficiently substantial. Hence although the earlier the precautionary measures are taken the sooner will the result eventually become evident the benefits will accrue to a future generation in industry rather than to those who have already been employed for some years.

Finally while the result of this survey of a fatal disease presents points of interest it is of greater practical importance when preventive measures are being considered to know the time which a carcinogenic agent is taking to produce an outward manifestation of the disease in man. Information regarding this cannot be deduced with any accuracy from the age of death when the duration of employment is unknown and when the fatal termination of

the disease may occur only long after the primary manifestation of the growth.

C. TRAVERS SEPTA, M D

MISCELLANEOUS

Walther H W R Urinary Antiseptics *J Am M Ass* 1937 109 909

An ideal urinary antiseptic for internal use has not yet been found. Recent investigations of a more scientific nature however should convince many skeptics of the need for these agents in urological therapy. These studies reemphasize the dangers of an indiscriminate use of a single drug for all types of infections in the urinary tract.

From a clinical point of view four effects have been attributed to oil of santal: an inhibitory effect on the secretion, a relief of spasm, a sedative effect and a diuretic action. The Council on Pharmacy and Chemistry of the American Medical Association in its 1936 edition of *Useful Drugs*, recognizes oil of santal but recommends the restriction of its use in gonorrhea to the subacute and chronic stages in which its irritant action may stimulate healing. Although less popular than formerly oil of santal and the other related volatile oils still have a place in urinary antiseptics.

Hinman in evaluating methenamine called it the most efficient urinary antiseptic in the greatest number of cases but drew attention to its very definite limitations. The value of methenamine for kidney antiseptics is largely destroyed by the necessity for concentration and for time to permit accumulation of formaldehyde in antiseptic amount. The same is true for cystitis unless retention is present. Edwin Davis in 1932 stated that methenamine is incomparably more efficient than either pyridium or beryl resorcinol in causing the normal person to secrete urine that is antiseptic against both the colon bacillus and the staphylococcus. In 1937 he had not changed his opinion. In answer to a recent questionaire he states: With respect to methenamine I am forced to the conclusion that this is a valuable remedy the merits of which we have tended to overlook in our search for something new and better. He writes that it has been demonstrated that the administration of methenamine together with ammonium nitrate or chloride imparts an antiseptic value to the urine with amazing consistency—an observation that he has been able to verify with subsequent checks. Helmholtz warned in 1932 that treatment with methenamine without constant control of the hydrogen ion concentration is likely to be unsuccessful. He found as the result of experiments that at a pH of 6 urine with a 0.5 per cent concentration of methenamine rarely sterilizes itself at the end of twenty four hours. At a pH of 5 urine can be sterile after four hours at 37°C.

Methylene blue became very popular during the last decade of the nineteenth century when it was turned to good account in gonococcal infection. It also found a peculiar application in tuberculous con-

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Compere, E. L., and Adams, C. O.: Studies of Longitudinal Growth of Long Bones. I. The Influence of Trauma to the Diaphysis *J Bone & Joint Surg*, 1937, 19 922

The writer and his associates present this paper as the first of a series of studies directed toward a better understanding of the physiological processes regulating the rate and extent of long-bone growth. That certain factors, such as disease, trauma, or glandular dysfunction, may alter such growth is well known but investigators do not agree in their attempts to explain (1) why overgrowth of a long bone of a child occasionally occurs after fracture of the shaft, (2) why the epiphyses fuse to the shaft with complete cessation of longitudinal growth shortly after puberty, (3) what insults to the bones will consistently stimulate, retard, or arrest longitudinal growth, (4) what deformities may be predicted following insult to the growing epiphyses, (5) how the epiphyses, themselves, grow, (6) through what biological mechanism acute or chronic systemic infections may alter the longitudinal growth of bone, (7) the relation between delayed puberty and delayed closure of epiphyseal lines of long bones, (8) the effect on rate or extent of longitudinal growth of bone or interruption of blood supply to the shaft, the metaphysis, or the epiphysis, (9) whether it is possible for the epiphysis, once destroyed, to regenerate and to function as a growth center, and (10) why all long bones are preformed in cartilage and only a few bones of the head and face are formed in membrane.

Ollier first noted that irritation of the shaft of a bone could cause increase in the rate of growth and that it might produce overgrowth of as much as one-fifteenth of the total length of the bone. This study has been carried on further by others, including Kishikawa, Ferguson, and Lambert.

The authors' investigations were based on experiments with rabbits. In the first experiment the femurs of 6 rabbits were injured with minimal damage to the soft tissues. It was found that trauma sufficient to interrupt the medullary blood supply but not great enough to cause a regional hyperemia during the period of bone repair will not consistently cause growth stimulation and overgrowth.

Further experiments revealed that gross trauma, involving a considerable portion of the shaft of a long bone and necessitating extensive repair over a long period of time, produces epiphyseal stimulation and longitudinal overgrowth, the increased rate of growth continuing only during the period of healing. This longitudinal overgrowth of bone following fracture of the shaft occurs entirely from stimulation of the epiphyseal growth cartilage and not from the

diaphysis or the cartilaginous callus which forms at the site of the fracture.

The longitudinal overgrowth which may accompany a fracture occurs regardless of whether or not there is initial shortening as a result of overriding or loss of shaft substance. This observation, together with the fact that overgrowth may occur also after gross trauma without loss of continuity of the shaft of a bone, such as excision of a full-thickness tibial bone graft, is further evidence to support the theory that local hyperemia is the basic stimulus and that it is not a compensatory phenomenon.

Chronic localized inflammation of the diaphysis due to an irritant foreign body may result in marked bone proliferation with an increase in the diameter of the shaft. There is some evidence that under these circumstances localized interstitial longitudinal growth may occur. This possibility is deserving of further investigation. RUDOLPH S. REICH, M.D.

May, H.: The Regeneration of Bone Transplants. *Ann Surg*, 1937, 106 441

Experiments were undertaken in which whole radii of dogs were taken out by opening the joint capsules and subperiosteal dissection, and the bones were reimplanted in their original location. The periosteum, which had not been separated from the surrounding tissues, was sutured over the bone and the joint capsules were closed. Four of the operations were successful and were not complicated by infection. The animals were killed five weeks, ten weeks, four months, and ten months postoperatively. The involved limb was injected with radiopaque material through the axillary artery and the radius roentgenographed after removal from its periosteum.

The revascularization thus illustrated was divisible into three stages. In the first stage (after five weeks) numerous small vessels coming from the periosteum penetrated the cortex. The second stage or transformation (after ten weeks and four months) showed replacement of this fine vascular network by a few larger vessels. This process was completed during the stage of functional adaptation of the bone (after ten months). On histological examination, it was found that after only five weeks the entire graft was necrotic except for the marrow in a few regions, notably adjacent to the articular and epiphyseal plate cartilages, where active myeloid cells were abundant. In animals killed ten weeks and four months postoperatively the bone was being transformed into living bone, apparently by creeping substitution. In the animal examined ten months postoperatively the entire graft was viable. No evidence of osteoclasia was found in cortical bone covered by periosteum, but in a few places where periosteum had been destroyed, incident to the operative procedure, the underlying bone exhibited osteoclasia by osteoclasts, fibrous tissue pene-

3.6 gm daily for three days and then 2.4 gm daily for from four to eight days. These authors warn against a continuance of the drug immediately on complaint by the patient of headache, fever, lassitude, cyanosis, general malaise, or extreme weakness. The author warns against so large an initial dose of this new drug as routine, since disagreeable and, at times, serious reactions may follow such a plan. He considers it far safer to begin by giving 1.2 gm daily for the first two days and if this is well tolerated, increase the dose to 2.4 gm daily for two days. Beginning with the fourth day, provided sulphanilamide is still being taken without untoward effects, the drug then can be gradually increased daily until 4.8 gm is reached. Provided adequate care is exercised, this drug will occupy an important niche in armamentarium for combating the various strains of coccic invasion.

None of the present known urinary antiseptics can be called specifics. Every new agent announced should be given its day in court; it should have a fair trial after which it will, as Davis has pertinently said, reach stability at its proper level of usefulness.

C. TRAVERS STREETE, M.D.

Habein, H. C. and Mulrooney, R. E. The Relation of Water, Sodium Chloride and Acid Base Balance to Renal Function in the Treatment of Lesions of the Urinary Tract. *Am J Surg* 1937 38:6

The preservation and maintenance of adequate renal function is one of the most important considerations in the management of patients with lesions of the urinary tract. Functional disorders of the kidney associated with diseases of the urinary tract which are often called surgical diseases of the kidney differ from so-called medical nephritis with regard to origin, pathology, treatment and prognosis. Hypertension and arteriosclerosis are not directly related to surgical diseases of the kidney as is so often the case in glomerular nephritis.

Alterations in various components of the blood plasma may seriously affect renal function and retard its improvement. A knowledge of the physiological mechanism of renal function is essential.

The maintenance of a proper water balance is one of the most important factors in aiding the kidney to carry out its complete function, and the modern intravenous use of fluids is one of the significant advances in medicine. That this method of supplying fluids parenterally is at times a life saving measure cannot be doubted. However, there does not seem to be a uniformity of opinion at the present time regarding the amount and composition of the solutions to be used intravenously in the various conditions.

Edema is not a common complication in surgical diseases of the kidney, but it may develop as the result of the excessive intake of fluids, especially saline solution. The intravenous use of 5 per cent dextrose solution is probably preferable when fluids are to be given parenterally, unless there is a specific indication for other types of fluid.

The extrarenal causes of renal insufficiency such as the toxemias associated with prolonged vomiting and obstructive lesions in the upper part of the gastro-intestinal tract play an important role in the treatment of patients suffering from postoperative complications.

Lowering of the plasma proteins may occasionally when associated with malnutrition, anorexia and suppurative drainage be one of the factors in the production of edema.

The acid base regulation of the blood plasma is an important factor in the maintenance or improvement of renal function. One of the non-excretory functions of the kidney is the manufacture of ammonia. This mechanism is disturbed in renal insufficiency and produces acidosis. The treatment of acidosis associated with renal insufficiency by the intravenous use of alkalis, sodium lactate and Hartmann's solution is discussed.

The contracture of the shoulder which is already established should be treated on a double right-angle splint. By this means the joint will be brought into the middle position, with the shoulder abducted to a right angle. The arm at first should not be brought higher than possible without pain. Through the placing of the arm upon the splint the cramp in the muscles decreases, and little by little the arm may be brought into the desired middle position. This is the only correct treatment, baths, massage, and injections are not correct. The splint must be worn uninterruptedly, even at night. From the first placing upon the splint the exercise must go forward to full raising aloft, to adduction of the 90° elevated arm, and eventually to full internal rotation of the arm.

The double right-angled splint is a great advance over the Hacker triangle or the Middeldorpf triangle. The new splint is light, is applicable to both sides, and in addition can also be used for the treatment of fracture of the clavicle and dislocation of the acromioclavicular joint.

(SALZER) HAWTHORNE C WALLACE, M D

Spurling, R. G., Mayfield, F. H., and Rogers, J. B.: Hypertrophy of the Ligamenta Flava as a Cause of Low Back Pain. *J Am M Ass*, 1937, 109 928

Low back pain with or without radiation into the legs, together with objective neurological changes, such as sensory or motor loss about the buttocks, sexual impotence, and sphincteric disturbances, must be due to an intraspinal lesion. Hypertrophy of the ligamentum flavum should be considered the cause of such a clinical picture. This hypertrophy occurs most frequently between the fourth and fifth lumbar vertebrae and is probably the result of trauma or strain from postural deformity. It is associated with thickening of the lamina of the fourth lumbar vertebra and produces symptoms by adhesion to the dura and pressure on the cauda equina.

The symptoms in 7 cases which were studied included low back pain of sudden or gradual onset, which was aggravated by exertion or change in position, and relieved somewhat by sitting or standing. Radiating pain in one or both legs was present in all 7 patients. Sexual impotence was complete in 3, sensory loss in the lower lumbar and sacral segments was found in 5, and motor loss in the legs was described by 4. All had some degree of postural deformity with tenderness to pressure over the lower lumbar spinous processes.

A careful neurological examination is essential in differentiating intraspinal from extraspinal lesions. Spinal puncture below the fourth lumbar interspace revealed a block with elevation of the protein content of the spinal fluid, and in 6 patients studied by means of injections of iodized oil a characteristic filling defect was demonstrated opposite the fourth lumbar interspace. The hypertrophy of the lamina was not demonstrated roentgenographically, but in

all 7 patients the normal lumbar spinal curvature was absent.

The treatment of this lesion is surgical resection of the involved lamina and hypertrophied ligament. It may be performed under local anesthesia, with the addition of spinal anesthesia if it is advisable to open the dura and inspect the cauda equina. The patient is allowed up on the twelfth postoperative day. Of the 7 patients treated, 1 died of a streptococcal wound infection. The other 6 had prompt relief from symptoms with good recovery.

CHESTER C GUY, M D

Kleinberg, S.: Sciatic Scoliosis. *Am J Surg*, 1937, 37 418

Sciatic scoliosis is a lateral deformity of the trunk secondary to a painful lesion of the lower back or buttocks, or to sciatica. The lateral tilt of the trunk is the result of an instinctive effort to assume a posture which will relieve or mitigate the pain.

The subjective symptoms are:

1. Pain. The pain is fairly constant and is aggravated by any movement of the trunk or lower limb which puts tension on the sensitive area.

2. Abnormal gait. In severe attacks there is a marked limp and inability to walk more than a few feet at a time.

3. Stiffness of the back. The degree of stiffness varies with the intensity and location of the causative lesions.

4. Deformity of the back. The deformity often causes the patient to go to the doctor early.

The objective signs are:

1. Deformity. The deformity consists of a lateral and forward inclination of the trunk. The back is abnormally flat.

2. Mobility of the spine. All of the movements of the spine are restricted. The anteroposterior mobility is affected to a greater degree than the lateral motion.

3. Muscular spasm. This causes limitation of motion in the back and is the result of an instinctive effort to reduce the pain.

4. Tenderness. Deliberate and accurate testing will give important evidence of the location, extent, and intensity of the lesion.

5. Roentgen-ray findings. The roentgenogram of the back shows a scoliosis. The curvature of the spine in sciatic scoliosis is characterized by marked deviation and very little rotation of the vertebrae. One may find many anomalies which rarely are responsible for the present disability.

6. Additional signs. One often sees atrophy of the thigh and buttocks and a diminution or absence of the ankle reflex on the affected side.

In the history of its onset and course, sciatic scoliosis affects the vigorous and the robust, and is most commonly observed between the ages of twenty and forty years. Men are much more commonly affected.

Lesions of the joints of the lower back are due either to sprains or arthritis. Lesions of the muscles

trating the haversian canals. In these regions some new bone formation was also present some having been laid down generally by the periosteum.

The author concludes that in patients quick vascularization of the grafts is essential if the graft is to be ideally revascularized. Hemorrhage should be strictly controlled at the grafted site and all dense fibrous tissue in the region should be carefully removed. Moreover, since the bone of the graft originally becomes necrotic and is only gradually returned to life during later stages of the transformation, absolute immobilization of the operated bone is essential for ideal healing. The author states that bone grafts are usually largely revascularized and alive in from eight to ten weeks in the absence of infection. At this period as demonstrated by roentgenograms he partially removes the dressings and begins physical therapy. Various types of grafts and controversial literature on the fate of bone grafts are discussed. ROBERT FORRIS, M.D.

Lawda J. Shoulder Pains (Schulterschmerzen). *Bratislav lek Listy* 1937 17 186 215.

The author considers all morbid conditions of the shoulder joint and its surroundings under shoulder pain. Anatomical relations of the joint and its surrounding especially of the numerous bursae are emphasized. In every case he determines exactly whether the difficulty in question is in the joint itself or in the neighboring parts. The changes which follow accidents, infections, rheumatic and climatic conditions, neuritis, sarcoma, osteitis fibrosa, syphilis, tuberculosis, gonorrhea, lead poisoning, trichinosis and finally periarthritis of the scapulohumeral joint are all considered and their treatment is discussed. Pain in the shoulder is considered the expression of manifold states of disease just as sacral pain or headache. The shoulder has the advantage over most of the other joints in that several diseased states which heal through rest soon fix the joint itself as tuberculosis. In considering shoulder pain one must immediately distinguish which part really hurts, whether it is the shoulder joint itself, the acromioclavicular joint or the tissue in the immediate neighborhood such as the bursae or muscles.

The author distinguishes four different classes of shoulder pain:

1. Pain which follows accidents.
2. Pain which is projected from an outside source which has nothing to do with the joint. This pain in the shoulder can indeed be a worth while diagnostic help especially in acute diseases of the lung and stomach and arises through mechanical, chemical or inflammatory stimulation of the phrenic nerve.
3. The author considers pain of the shoulder as it arises in a vast array of conditions mostly infectious in origin such as septicemia after delivery and various generalized osteomyelitis suppurative inflammations of the shoulder joint, the different kinds of arthritis—especially gout, neuritis and neuralgias of the brachial plexus, myalgias, and also osteitis fibrosa. Tumors are also considered especially

sarcomas. Syphilitic changes are hard to interpret and are often confused with periarthritis of the scapulohumeral joint. There is however this difference in the syphilitic process the site of maximum pain is found on the dorsal aspect of the articular fossa. Tuberculous changes in children express themselves in fungous forms but in adults rather as a dry caries. Gonorrheal infection in the acute or chronic forms may be accompanied by joint changes. Shoulder pains are characteristic of chronic lead poisoning and are found occasionally with trichinosis if the embryos of the trichinae settle in the surrounding muscle.

4. The author places under a class called periarthritis of the scapulohumeral joint all the morbid conditions in the neighboring surroundings of the joint especially in the subdeltoid space and the numerous bursae. These have a very definite clinical picture and follow inflammation or accident. Many times pain will arise in the shoulder during the menstruation and one must then consider the disorders of internal secretion or metabolic processes. In this fourth class one frequently will find para-articular calcification in the bursae or in the neighborhood by roentgen ray examination. Many times however the roentgenogram is negative except for bone atrophy which follows immobilization of the joint.

In the treatment it is very important to splint the joint in abduction and to use early active and passive motion with massage and local heat. Fever therapy with colon vaccines and short wave diathermy has been used. A pirouette of the bursa may be necessary. Roentgen and radium radiation have been used. With failure of conservative treatment removal of the bursa is necessary.

(HARRI) HAWTHORNE C WALLACE M.D.

Schneel, F. G. The Origin, Prevention and Treatment of Contractures of the Shoulder (Entstehung, Verhütung und Behandlung der Schulterkontraktur). *Wien klin Wochenschr.* 1937 2 1127.

This report is concerned only with the contractures of the shoulder which appear after injury. These contractures are mostly the result of the triangular arm sling which the author calls the *cadaver cloth* of the arm. They are found mostly among old people especially after the use of the bandages of Velpeau or Desault. In the beginning one often finds an effusion into the joint. The contracture is the result of the shortening of the muscles in the neighborhood of the joint chiefly of the subscapular muscle. The levator scapulae muscle will quickly atrophy following fixation in the extreme position.

Prophylaxis is the best treatment. Systematically all muscles of the arm must be used daily. There are no patients who alone and without guidance can correctly carry out these motions. The physician must supervise and see that the motions are carried out daily or at least every other day. Also when the bandages are secure the patient must be urged to use such joints as are free.

The author discusses the results of treatment and emphasizes that the Orr postoperative treatment gave the best results. Including the patients first treated in the hospital and those treated outside before coming in, the mortality was 21 per cent among those receiving radical treatment with adequate resection, 50 per cent among those in whom only soft-tissue abscesses were incised, and 40 per cent among those treated entirely conservatively, without operation. The continued morbidity was also much less among patients treated radically.

The author discusses operative treatment and the anatomical and surgical aspects of different procedures. Primarily, the systemic infection must be taken care of until definite localizing signs appear. Soft-tissue abscesses may be simply incised before definite bony localization can be proved, but when the presence and location of osteomyelitis is established, wide excision of the affected bone is the ideal to be attained. When the Orr postoperative technique is employed, radical operation is not as serious a procedure as might be expected.

Eighteen cases are presented which illustrate various phases of the subject under discussion. Brief discussions of the histories and the operative procedures, and several roentgenograms and photographs are given. ROBERT PORTIS, M D.

Smets, W.: Juvenile Osteopathy of the Patella (L'Ostéopathie juvénile de la rotule). *Rev d'orthop*, 1937, 24 479

This lesion is diagnosed by the presence of poorly defined pain phenomena at the level of the tip of the patella with typical roentgenological findings, and corresponds to Koehler's disease of the tarsal navicular. The disease is found in girls between the ages of nine and thirteen and in boys from eleven to fourteen years of age. Clinically, these patients are cured with from a few weeks to a few months of rest.

Changes in the tibial tubercle and the lesser trochanter of the femur may be found at the same time. The lesion is similar to, and often associated with Osgood-Schlatter's epiphysitis of the tibial tubercle. One investigator, by studying a series of roentgenograms, shows that this phenomenon is a normal step in the normal ossification of the patella and has been found in normal children studied systematically. Diseases of the lesser trochanter, the tibial tubercle, and the tip of the patella therefore appear to be but a simple variation of the normal ossification. The possibility of the effect of an endocrine disturbance must be considered.

RICHARD J BENNETT, JR, M D.

Carrell, W. B.: The Use of Fascia Lata in Knee-Joint Instability. *J Bone & Joint Surg*, 1937, 19 1018

The author reports his experience with the use of fascia lata in the treatment of knee-joint instability in repair of the anterior cruciate ligament, support for hyperextension weakness, and repair of the medial ligament.

Repair of the anterior cruciate ligament is accomplished by passing a fascial strip, reflected from the outer side of the thigh, around the lateral condyle to enter the posterior compartment of the knee directly over the origin of the normal anterior cruciate ligament. The attachment of the fascial strip is made through a drill hole in the tibia at the point of insertion for the ligament. The technique of the operation is described in detail. Following operation the knee is put up in plaster in a position of 170 degrees for four weeks. A brace is then fitted and exercise started with gradual extension of the leg. The brace should be worn for from sixty to ninety days. Seven case reports are given in which good results were obtained following this procedure. Patients with uncomplicated cruciate ligament injury and even those with associated rupture of the collateral ligament will recover in most instances if early and adequate fixation is established.

To provide support for hyperextension weakness, a strip of fascia reflected from the outer side of the thigh, 2 in wide and 8 in long, is passed between the tibia and the fibula just below the head of the fibula, to reach the posterior compartment behind the knee joint. The strip is drawn upward in contact with the posterior capsule, passed through two drill holes in the posterior surface of the femur, and then directed downward to emerge on the anterior surface of the leg through the same compartment between the tibia and the fibula. It is attached under tension with silk ligatures. Following the operation the knee should be put up in plaster for eight weeks in a position of flexion of 10 degrees more than is desired for future function. On removal of the plaster a brace is fitted and gradual extension is secured. This operation has been performed in 12 cases with no recurrence of hyperextension at the time of writing with apparently good results.

For repair of the medial ligament of the knee a strip of fascia lata is brought out from the posterior surface of the femur to pass over the epicondyle and is attached on the tibia. The leg is put up in a straight position with plaster from the toes to the groin. A walking boot is attached and the plaster is worn for eight weeks. Flexion and function are assisted with quadriceps exercises for another forty or sixty days. One case is reported in which a bone block was added because of extreme displacement.

RUDOLPH S REICH, M D

Kienboeck, R, and Mueller, W.: Os Tibiale Externum and Lesions of the Foot (Os tibiale externum und Verletzung des Fusses). *Ztschr f orthop Chir*, 1937, 66 257

The term "os tibiale externum" is not entirely correct, since this skeletal anomaly represents an enlarged and altered epiphysis of the tuberosity of the navicular bone, it is an accessory bone and is more properly called "os epiphyseos navicularis." An accurate study of the roentgenograms permits a differentiation of four types. The accessory bone may be united with the parent bone, or an abnormal

and fascia of the lower back are caused by strains of the muscles of the back or buttocks, myositis of the muscles of the back or gluteal regions, or by sciatica.

In the myositic type of cases the lesion is insidious and probably due to an infection of the teeth or tonsils, or to an intestinal stasis.

The pathology of sciatic scoliosis is primarily that of the exciting lesions such as sciatica, sprain or arthritis of the sacro-iliac or lumbar articulations as well as derangements of the soft tissues of the lower back.

Sciatic scoliosis is not a complication of any one type of occupation as it occurs in individuals who lead a sedentary life as well as those engaged in active work.

In the differential diagnosis there must be considered (1) a general systemic upset, (2) an abdominal or retroperitoneal lesion, and (3) disease of the spinal cord meninges or spinal column.

In the presence of any systemic disturbance it and not the sciatic scoliosis should receive primary attention. Should some focus of infection be found such as an infected tooth, diseased tonsils, sinusitis, prostatitis or intestinal stasis it should receive appropriate therapy.

Local therapy to the back depends on the type and degree of the sciatic scoliosis which may be divided into mild, moderate, and severe forms. In mild sciatic scoliosis, the most important single measure is absolute rest in bed. In the moderate sciatic scoliosis the patient should rest in bed for several weeks. After that he should receive physical therapy and wear some form of low back support, such as a brace, corset or belt. The most effective support is a plaster of Paris jacket. When the individual is ambulatory and receiving physical therapy manual stretching of the sciatic nerve is frequently effective.

The sciatic nerve may be injected with 1 per cent novocain or one may employ a caudal block injecting from 40 to 100 c.c. of 1 per cent novocain or simple saline solution into the neural canal at the caudal hiatus.

The treatment of severe sciatic scoliosis includes a thorough stretching of the tissues of the back and mobilization of the spine to permit the re-establishment of the normal curve of the spine. In addition, when severe or prolonged sciatica has existed the sciatic nerve should be stretched to overcome the perineural adhesions.

Open operations are indicated in specific cases. When the symptoms point to an inflammatory involvement of the gluteus medius or maximus it is well to strip these muscles from the ilium. In cases in which there is definite sacro-iliac arthritis which has not yielded to the rest following the stretching, an extra articular or intra articular fusion of the sacro-iliac joints should be performed. In recurring or obstinate lumbosacral arthritis a proctocolectomy is considered advisable.

RICHARD J. BENNETT, JR., M.D.

Kulowski J. Pyogenic Osteomyelitis of the Pelvis. Analysis and Discussion of 90 Cases. *Arch Surg.* 1937, 35: 571.

Of a series of 1,496 patients with pyogenic osteomyelitis seen at the University Hospitals in Iowa City 90 or 6 per cent, had foci in the pelvis. The age of the patients varied from two to sixty-three years, the average age being sixteen years. In 60 per cent of the group the disease began during the second decade. History of antecedent trauma was present in 35 cases. In 23 cases there was direct infection from neighboring suppuration or open wounds. In 67 cases the localization was hematogenous in origin. In 55 cases the pelvic focus was the initial bony localization. There were two age groups with respect to predilection for growth zones. The first extended from infancy to puberty at which time the acetabular bones fuse. During this period the lesions tend to be most diffuse almost invariably starting from the acetabular border. The second group extended from puberty to the age of 25 years during which time marginal epiphyses were present.

Osteomyelitis in the sacro-iliac region usually began on the sacral side. In 4 cases in which the lumbosacral joint was involved the osteomyelitis was bilateral and all the patients died. In 70 per cent of the cases foci other than the primary pelvic developed chiefly by extension notably to the hip joint.

The bony reaction tended to be dry as a subacute or chronic inflammation while extensive soft tissue suppuration was characteristic. The generally caecellous nature of the pelvic bones tended rather to the production of caries than sequestration but sequestra were not uncommon. In the sacro-iliac region the sequestra were usually small and situated antero-inferiorly. The thin cortical bone of the iliac wing was predisposed to early perforation and sequestration especially on the pelvic side. Large irregular purulent cysts filled with sequestra and debris often developed on this surface. The entire iliac wing was occasionally necrotic. In the later stages of the disease the entire ischium sometimes lay in a soggy bed from which it could be lifted en masse. Periosteal bone formation about the pelvis in osteomyelitis was very marked if the periosteum was not necrotic. Frank suppuration was present in this series in 83 per cent of the cases and tended to gravitate or invade along the fascial planes. Such purulent collections predominated the surgical picture because they were formidable sources of local and systemic infection.

The diagnosis of the lesion was discussed especially with relation to involvement of the hip and the sacro-iliac joint. In the hip region aspiration was a great diagnostic aid and in the sacro-iliac region exploration and biopsy were indicated when the exact nature of the pathology was difficult to determine. Roentgenograms were indispensable for diagnosis and included the entire pelvis. The injection of sinuses with radiopaque substance was also very important.

that did not exist before was produced. Antagonistic transplants will apparently function properly if Scherb's law is obeyed. The law, in short, is that all muscles previously antagonistic must remain completely paralyzed in order that the transplant may function.

The short peroneal and posterior tibial tendons are mechanically poor transplants, the peroneus longus being the logical substitute in this paralysis.

In paralysis of the anterior tibial muscle transplantation of the extensor hallucis longus compensates for flexion-adduction paralysis.

If the extensor hallucis longus is insufficient, its effort may be augmented by a tendon of silk from the extensor digitorum communis longus attached to the inner border of the foot. Better yet, the entire extensor digitorum communis longus may be transplanted into the anterior tibial muscle along with the extensor hallucis longus.

In transplantation of the long lateral peroneal tendon into the anterior tibial muscle, Scherb's law again holds true. The authors have shown that the transplanted muscle contracts voluntarily, but that there is no contraction in the course of automatic walking.

Transplantation of the short peroneal tendon is not, as in the case of the long peroneal tendon, a purely antagonistic transplantation. Scherb has stated that this muscle may be transplanted as a flexor or as an extensor. The short peroneal tendon is a very poor transplant.

When the anterior tibial and posterior tibial muscles are paralyzed a valgus exists which is always difficult to correct.

Two cases of Mommsen are cited in which excellent results were obtained from transplantation of the extensor hallucis longus tendon into the anterior tibial. Five cases of Gocht are reported in which the results were poor.

Transplantations of the long peroneal tendon into the inner side of the foot give questionable results, in fact, the use of this muscle is contra-indicated.

Transplantation of the short peroneal tendon combined with that of the extensor hallucis longus, has been found satisfactory.

The hypercorrection following transplantation of the two peroneal tendons is due more to the total suppression of the pronators than to the efficiency of the transplanted muscles.

In paralysis of the peroneal muscles with or without paralysis of the extensor communis, transplantation of the anterior tibial tendon to the external border of the foot is very likely to cause a hypercorrection of the valgus. Some surgeons prefer to transplant the extensor hallucis longus, but several other plans are also suggested.

The results of transplantation of the extensor hallucis longus tendon to the external border of the foot are universally poor because of the weakness of this muscle.

Transplantation of the extensor hallucis longus and the flexor hallucis longus tendons to the plantar

surface of the cuboid have been tried with total failure.

In equinus foot the reestablishment of muscular equilibrium should overcome weakness of the triceps and produce a balanced lever, that is, a calcaneus versus muscle transplant. Methods of improving this condition are: (1) the transplantation of healthy tendons to the midtarsal portion of the foot, (2) lengthening of the sural triceps, (3) transplantation of the extensor hallucis longus into the anterior tibial tendon, and (4) transplantation of two tendons of the extensor digitorum communis longus.

Transplantation of the posterior tibial tendon into the first metatarsal across the interosseous space may be of value.

In hollow foot the tendon of the extensor hallucis longus has been transplanted to the head of the first metatarsal following correction of the cavus by the method of Steindler-Spitzzy. In 1 case a subastragular arthrodesis was carried out to correct the varus. In 3 cases good results were obtained.

RICHARD J. BENNETT, JR., M.D.

FRACTURES AND DISLOCATIONS

Campbell, W. C.: Malunited Colles' Fractures. *J Am M Ass*, 1937, 109, 1105

The author presents an operation for the correction of malunited Colles' fracture. Following an osteotomy of the radius about 75 of an inch above the joint, he removes a pyramidal wedge of bone from the medial aspect of the lower extremity of the ulna. He inserts this graft into the space made by the osteotomy as the lower end of the radius is forced downward and forward. This procedure corrects both the shortening and the dorsal angulation of the lower end of the radius as well as removes the prominence of the ulnar head.

The author has done this procedure in 19 cases, in 11 of which the end-results are excellent, 7 are unknown, and 1 case is too recent for the determination of the amount of function.

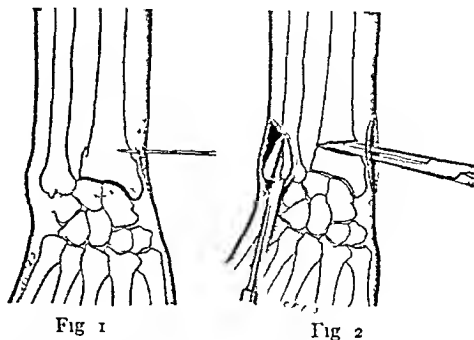


Fig 1

Fig 2

Fig 1 Osteotomy of the radius three-fourths inch proximal to the articular surface. Fig 2 Hemostat inserted between fragments to correct radial shortening, pyramidal wedge of bone removed from ulna.

fibrocartilaginous epiphyseal line may be visible between the two bones. Furthermore a completely separate accessory bone may be in relation to the body of the navicular bone through an intervening joint this is an articulating epiphysis. Finally, a completely isolated accessory bone may lie as a sesamoid, wholly within the tendon of the tibialis posterior muscle. The anomaly may appear unilaterally or bilaterally, and may be symmetrically or irregularly developed. The reasons for suspecting this anomaly are mainly spontaneous pain or pain following an injury, after which the roentgenogram reveals the accessory bone. Frequently an erroneous diagnosis of tuberculosis is made.

Brief histories accompany the respective roentgenograms of 5 verified cases and reference is made to analogous changes in other portions of the skeleton. (ERLACHER) JEROME G FINDER MD

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Wu Y K and Miltner L J. A Procedure for Stimulation of Longitudinal Growth of Bone. An Experimental Study. *J Bone & Joint Surg* 1937 19 909

Inequality in length of the bones of the extremities may result from one or more of a wide variety of causes which operate during the active growing period of the epiphyses. Either lengthening or shortening may result from the same factors. The former follows irritative or stimulative lesions and the latter follows destructive affections of the epiphyseal cartilage. In both the clinical and experimental fields, numerous observations have been made on this interesting subject.

It has been observed clinically that injury of the epiphyseal cartilage plate may retard or actually arrest the growth of bone but in overriding fractures of the shafts of long bones in children the resultant shortening is usually equalized by a subsequent compensatory increase in length and occasionally the affected bone actually becomes longer than the normal one. Infection, tumors, vascular disturbances, infantile paralysis and congenital anomalies also cause disturbance of the growth of the long bones.

It has been demonstrated experimentally by various investigators that longitudinal growth of bones takes place only at their ends. There are three chief sources of blood supply to each bone: the nutrient artery, the periosteal blood supply and the epiphyseal blood supply. Disturbance of one or more of these sources is undoubtedly a factor which alters the rate of growth of the epiphyses.

In the experiments performed by the authors on 52 rabbits various surgical procedures were employed with the hope of finding a method for stimulation of the longitudinal growth of bone. The first three groups of experiments (a repetition with minor modifications of the procedures of Weisenbach, Pearse, Ferguson, and others) failed to produce

significant increase in the length growth. By chance in several animals the authors observed that stimulation of the length growth was produced by the simple procedure of loosening or stripping the periosteum from the shaft of the bone. Consequently this operation was repeated on 22 animals, with uniform and significant results. With but 3 exceptions in 22 rabbits the operated leg showed definite lengthening when compared with the normal leg on the opposite side. Although the amount appeared to be small it actually represented an increase of from 5 to 15 per cent over the normal growth of the bone during that period of time. Observations of the monthly roentgenograms showed that the most active stimulation of length growth of the bones took place during the first three months following the operation.

The authors are unable to give a definite explanation of the factors which after the periosteum had been stripped produced this stimulation of the longitudinal growth. (RUBIN) S REES MD

Williams S W. The Early Treatment of Acute Staphylococcal Osteomyelitis. *Med J* 1937 1037 2 439

The author presents his results in the treatment of acute staphylococcal osteomyelitis with particular reference to the value of staphylococcus antitoxin. Two contemporary groups of cases are presented: the first group of 23 cases having received staphylococcus antiserum in addition to adequate surgical drainage with blood transfusions when indicated. The second group of 42 cases was a control group in which no serum was given.

The mortality rate was the same in both groups, 16 per cent. When the results were compared from the standpoint of duration of temperature, sequestrum formation, metastases and apparent wound healing no significant differences were noted in the two groups. Despite the results the author had the clinical impression that several of the cases had been benefited by serum therapy. He suggests that possibly one of the reasons why serum had apparently not proved of great value in this investigation was the use of too low a dosage.

DANIEL H LEVINTHAL MD

Leveau J and Perrot A. Tendon Transplantation in the Treatment of Paralytic Club Feet (*Les transplantations tendineuses dans le traitement des pieds bots paralytiques*). *Rev d'orthop* 1937 24 393

In paralysis of the sural triceps muscle the transplantation of the posterior tibial and short lateral peroneal tendons does not alone give a satisfactory result. The best results have been obtained when the longer peroneal tendon is transplanted into the calcaneus. In transplantation of the two peroneal and the posterior tibial tendons there is a marked discrepancy according to the reported results and failures are reported in some instances. In some cases the plantar flexion was satisfactory but even

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Verschuyt, E.: Dangers of Arteriography (Die Gefahren der Arteriographie) *Nederl Tijdschr v Geneesk*, 1937, p 1007

The author reports on the complications of arteriography. Described first of all in the French literature is cyanosis of the skin with characteristic violet spots. These spots later become gangrenous. The gangrene may develop without any transition stages. A summary of the reports on the clinical and experimental use of various contrast media is made. Organic iodide compounds as well as thorotrast can cause damage to the vessel endothelium. Perabrodil has no vasomotor influence. Thorotrast dilates the vessels. Uroselectan and tenebryl cause a spastic contraction of the vessels, followed by a dilatation of the capillaries and veins with stasis. In order to determine the individual reactivity of the vasomotor system to arteriography, adrenalin and histamine were injected. The following case is reported.

Sudden pain occurred in the right leg in a seventy-year-old man. The leg became pale, sensitive and cold. The pulse was not palpable. Vascular spasm or embolus occurred and arteriography was performed. The aorta was punctured at the level of the third lumbar vertebra and 20 ccm of 35 per cent perabrodil were injected. After this 0.03 gm of eupaverin with atropine were injected intramuscularly. The roentgenogram showed a closure of the right common iliac artery just proximal to its point of division. Shortly after the perabrodil injection, before the eupaverin could take effect, the color of the leg was normal, but the pulse was not palpable. Death occurred suddenly two days later. At autopsy the pericardial sac was filled with blood in consequence of a tear in the ascending aorta. All layers of the ascending and descending aorta could be easily separated. A large retroperitoneal hematoma was found. There was no tear in the abdominal aorta, occlusion of the right leg vessels, nor appreciable arteriosclerosis.

The authors attributed the sudden release of the arterial spasm and the death to the perabrodil injection. The aorta puncture caused the retroperitoneal hematoma, favored by the friability of the aorta. On the basis of 2 cases, the author also warns of the possibility of epileptic convulsions after perabrodil injections into the subclavian artery (HEINECHE) PHILIP SHAPIRO, M.D.

Lindgren, S.: Arterial Symptoms in Deep Thromboses of the Leg (Arteriensymptome bei den tiefen Bein thrombosen) *Uppsala Lakaref Forh*, 1937, 42: 415

The author has observed 2 cases in which thrombosis of the deep leg and pelvic veins was ushered in

by signs of a massive arterial embolism, absence of pulse, a mottled corpse-like coloring and coldness of the extremities, and disturbances of the reflexes and sensibilities. Immediate exposure of the artery in one case, and autopsy in the other demonstrated open but markedly contracted arteries and a fresh venous thrombosis. A number of similar cases are described in the literature. These observations induced the author to study the relation of the arteries to the usual thromboses of the femoral and iliac veins.

According to Nystroem and Guilleminet, the weakening of the pulse in the femoral artery in the groin as compared to the normal side, is an early symptom of venous thrombosis, even before the occurrence of edema. The author has studied the question by oscillometry. This showed that the blood flow in the artery was diminished in most cases, if not in all, by deep venous thrombosis. The diminution in the arterial pulse wave is most apparent in the first few days, especially on the first day. Then the blood flow in all cases again returns to normal after a variable period of time, but no prognostic conclusions can be drawn from this. The diminution of the blood flow is independent of the occurrence of an edema and the narrowing of the arterial lumen by the travelling arterial thrombi, and is rather the result of a spastic contraction of the vessel. This vasoconstriction results not only from stimulation by the thrombi but is also on a functional basis since only a moderate amount of blood can flow through the thrombosed veins. A diminution of the arterial blood flow occurs, however, only in thromboses of the large deep veins, not in thrombophlebitis of the saphenous vein or of the smaller venous branches of the lower extremity. The oscillometric study is valuable for early diagnosis of deep thromboses, although, according to Nystroem, the determination of a weakening in the femoral pulse by means of palpation is just as effective in all cases in which there is a definite diminution ~~indicated by oscillometry~~ (VON HASSELBACH) JACOB E. KLEIN, M.D.

Lund, C. G.: The Treatment of Embolism of the Greater Arteries. *Ann Surg*, 1937, 106: 880

This report was developed by the author from data derived from the case reports of 55 patients upon whom the diagnoses of peripheral arterial embolism and thrombosis had been made. The abbreviated case histories form a part of this report and are considered with respect to the condition of the patients at the time of their discharge from the hospital.

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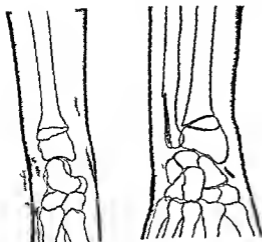


Fig. 3 Posterior angulation corrected by dorsal wedge of graft radial length maintained by lateral wedge of graft prominence of ulna removed

Drawings and roentgenograms illustrate the article
BARBARA B. STIMSON, M.D.

Burnett J. H. Further Observations on the Treatment of Fracture of the Carpal Scaphoid (Naricular). *J. Bone & Joint Surg.* 1937 19:1099

The author presents a study based on the end results of fracture of the carpal scaphoid covering a period of from four to seven years after injury.

During 1934, 1935, and 1936, 100 patients with this fracture were treated in the out patient department of the Boston City Hospital. Inasmuch as 48 per cent of these patients were twenty years of age or under, the author believed that the condition

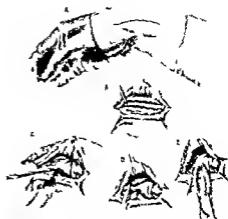


Fig. 2 Operative technique

was one which affects young people and should be treated early. Any sprained wrist which does not clear up in a month should be roentgenographed again with a fracture of the scaphoid in mind. If the diagnosis is made in a fresh case the author believes that a plaster of Paris cast in a cock up position with slight radial flexion should be applied and maintained for at least six weeks. When there is a marked separation of fragments he believes it is possible to reduce the fracture and peg the fragments. In late cases with non union operative treatment with the use of a bone peg has given satisfactory results. He describes the type of operation he advocates.

Roentgenograms and case histories illustrate the article
BARBARA B. STIMSON, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

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Until recently, the only active treatment of arterial embolism considered to be of real value was the operation of embolectomy. Two new non-operative procedures and one new operation have come into use with claims made for them that results can be

secured that are at least as good as, if not better than those following embolectomy. These procedures are (1) the use of a pulsating negative pressure pump to stimulate the circulation in the affected limb, (2) the use of an anti-spasmodic drug to overcome the immediate arterial spasm that follows the lodgment of the embolus and (3) the operation of arteriotomy, performed when a leg is affected in conjunction with procaine anesthetization of the lumbar sympathetics.

To determine the best treatment or combination of treatments suggested by the procedures it is important to study the results in a series of cases treated by any of these methods. In preserving this group of patients who were treated for the most part by embolectomy the author brings out certain features of the problem not previously emphasized.

Emboli that lodge in peripheral arteries usually arise in three places. The most common source is from the left side of the heart. The two less common sources are from the wall of an artery and from the pulmonary veins. In the event of an abnormal opening in the heart such as a patent foramen ovale paradoxical emboli arising in the peripheral venous system or right auricle may find lodgment in the peripheral arteries.

The effect of an embolism is to decrease the arterial blood supply to the area served by the artery or arteries involved. In the case of an end artery the result may be immediate and complete gangrene of the tissue or organ. In most situations the effect is relative; the degree of impairment of the blood flow varying with the efficiency of the collateral circulation.

After presenting detailed tabulations with discussions concerning them the author in this study of cases seen or treated personally concludes that after experience had been gained quite good results followed the operation of embolectomy when it was performed early on the arteries of the leg. No benefit is gained by such operations on the upper extremity. Emboli from the upper extremity as distinguished from that of the lower very seldom leads to gangrene. Nearly all of the patients who did not undergo embolectomy died whether or not there was gangrene or amputation.

HERBERT F. TULSTY, M.D.

BLOOD, TRANSFUSION

Domanig, E. The Transfusion of Preserved Blood (Die Transfusion konservierten Blutes) *Wien Klin Wochenschr.* 1933, 2: 1067.

Three conditions must be fulfilled for the preservation of blood: (1) hemolysis must be prevented, (2) the blood must remain sterile and (3) the blood must be preserved in an icebox at 4°C. The

author fulfilled these conditions by the addition of a solution containing sodium citrate 10 parts glucose 20 sodium chlorate 0.5 and distilled water 100.0 to an equal amount of blood. This solution could be kept in condition for six weeks. The preserved blood showed a definite layering between the sedimented red corpuscles and the supernatant fluid derived from the blood serum and preserving fluid. If the solution does not show such a sharp line of demarcation or if there is the slightest red tinge to the supernatant fluid it should not be used.

The blood is kept in a paraffin coated Percy tube where it is mixed with the preserving fluid. Before use it is filtered through several layers of sterile gauze and administered by means of the Oellicher apparatus. Eighteen transfusions with conserved blood were carried out. The longest period that the blood was preserved was thirty-four days.

There were no severe reactions but this experience demonstrated that no other substance could be added to the blood to be transfused. Heating the blood over 40° or heating it over an extended period as well as the addition of physiological salt solution or 5 per cent glucose solution caused hemolysis.

The author prefers continuous intravenous drip in brain operations and is of the opinion that preserved blood is not equally a good for transfusion as fresh blood. (Juno) WILLIAM C. BECK, M.D.

Wikulow, A. W. Blood Transfusion in Obstetrics (Bluttransfusion in der Geburtshilfe) *Arch. Ginek.* 1937, 5: 52.

The most frequent indication for blood transfusion in obstetrics is afforded by severe blood loss and the consequent endangered condition of the patient. According to the author it is not always easy to decide whether the blood transfusion is immediately indicated. In cases of sudden severe hemorrhage the blood pressure, circulatory count, hemoglobin values and quality of the pulse may all afford an erroneous impression. In any case the author regards it unconditionally necessary to determine the blood group of every woman entering the clinic for delivery so that in case of necessary blood transfusion may be done with as little delay as possible.

From his own experience he finds himself a proponent of the most extensive recourse to blood transfusion. On the basis of copious statistical material he shows the beneficial effects of such transfusions. Not only is there immediate improvement in the subjective findings of the patient but likewise in the condition of the heart, vascular system, blood picture and hemoglobin values and, last but not least, there is a favorable influence on infectious processes.

(JUN) GLASBECK, JOHN W. BRENNAN, M.D.

SURGICAL TECHNIQUE

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Kernan, J. D., and Barach, A. L.: The Role of Helium in Cases of Obstructive Lesions in the Trachea and Larynx. *Arch. Otolaryngol.*, 1937, 26 419

The inhalation of helium to relieve obstructive dyspnea is based on the molecular lightness of this gas in comparison to nitrogen. A mixture of 80 per cent nitrogen and 20 per cent oxygen is three times as heavy as a mixture of 80 per cent helium and 20 per cent oxygen. The pressure required for moving a mixture of helium and oxygen is approximately one-half that required for moving air. Whenever there is obstruction to the movement of air in the respiratory tract, increased pressure is necessary to transport a volume of air to and from the lungs. If the obstruction is severe the respiratory musculature, even at maximal effort, becomes unable to ventilate the lungs with a volume of air sufficient to maintain respiratory function. Human subjects can breathe through a narrow orifice with from 35 to 50 per cent less pressure when a mixture of helium and oxygen is inhaled instead of either air or an atmosphere of 100 per cent oxygen. The pathological consequence of unrelieved respiratory obstruction, in either the larger or the smaller air passages, is the development of congestion and edema in the lung. The negative pressure which is induced within the chest during inspiration against a restricted orifice is from seven to ten times the normal value and exerts a suction action on the pulmonary capillaries. The first effect of increased negative chest pressures is to reduce the resistance of the flow of blood through the lungs, in addition, the dilating effect of the negative pressure on the right auricle and ventricle may increase the diastolic volume. The end-result of inspiratory obstruction is not only congestion and edema in the lung but also circulatory failure. The elevated negative pressure within the chest exercises suction on the capillary walls. This is the important factor in the production of intra-alveolar exudate. In addition, blood accumulates in the lung, building up an increased capillary blood pressure which makes for oozing of serum. As the lungs fill with blood an increasing negative pressure becomes necessary to ventilate them adequately, in this way a vicious circle takes place in which the increased effort to breathe is followed by an increased pathological state in the lung. These changes result from obstruction to inspiration and not from obstruction to expiration.

Employment of any remedy which will lower the pathologically elevated intrathoracic negative pressure not only will facilitate the ventilation of the lungs, but will ameliorate the consequences of increased negative pressure, and thereby tend to pre-

vent both congestion and edema in the lungs, as well as the conceivable disproportion in the output of the two ventricles and consequent failure of the left heart. At the onset of respiratory obstruction a sensation of dyspnea takes place in the absence of oxygen deficiency or accumulation of carbon dioxide. The human organism is accustomed to a certain velocity of air-flow in and out of the lungs, which appears to be interpreted through the Hering-Breuer reflex. The increased muscular effort necessary to maintain adequate or accustomed pulmonary ventilation gives rise to dyspnea. The inhalation of pure oxygen in this instance does not modify the sensation of shortness of breath, since there is equally as great effort in inhaling an atmosphere of 100 per cent oxygen as there is in inhaling air, there being little difference in the density of the two gases. However, when obstruction is long continued, breathing becomes rapid and shallow, and in addition, changes in the pulmonary circulation and the alveolar membrane take place, which give rise to anoxemia. Under these circumstances the inhalation of an atmosphere rich in oxygen aids the patient in two ways: (1) by decreasing the pulmonary ventilation, and (2) by increasing the functional capacity of the heart muscle. A decrease of the negative pressure within the chest does take place under these circumstances, i. e., when an atmosphere of 100 per cent oxygen is breathed. This decrease in the intrapleural negative pressure is related to the lessened volume of gas inhaled. Since a mixture of helium and oxygen may enter and leave the lungs with even less effort and with a more marked lowering of the intrapleural negative pressure than mixtures of oxygen and nitrogen, this mixture seems more applicable to the patient with obstruction in any part of the pulmonary airway. The effectiveness of helium is increased by administering the gas under a slightly positive pressure.

In clinical experience the mixture of helium and oxygen is generally administered at a positive pressure of between 2 and 4 cm. of water. This degree of increase in pressure decreases the inspiratory effort without unduly limiting the entrance of blood into the right heart. The concentration of oxygen employed is between 21 and 35 per cent, and depends on the degree of anoxemia which the patient presents. A concentration of 25 per cent oxygen, the remainder of the atmosphere being helium, tends to counteract the anoxemia frequently present and at the same time, by maintaining a high concentration of helium, overcomes the respiratory fatigue by decreasing the muscular effort necessary for breathing.

Of 21 patients, 11 received marked relief from the signs of obstructive dyspnea. Seven of these patients were removed from the atmosphere of helium and oxygen without the need for tracheotomy, although

1 of them had a tracheotomy as a precautionary measure two days later. All of them recovered. In the remaining 4 patients of this group who experienced marked relief as a result of the helium and oxygen therapy there was ultimately a fatal outcome, as a result of tumor in 2 due to a thyroid crisis in 1 and due to bronchopneumonia and subsequent tracheotomy in 1. In 3 patients little or no relief was evident, 2 patient being a marasmic infant with bilateral bronchopneumonia the second having severe laryngeal diphtheria and the third being a boy with leukemia who had showed marked sloughing of the epiglottis and the uvula.

MANUEL E. LICHTENSTEIN, M.D.

Duval and Mourgue Molines. Pathological Physiology and Treatment of Recent Extensive Cutaneous Burns (Physiologie pathologique et traitement des brûlures cutanées étendues récentes). *Presse méd.* Par 1937 45 1421.

In opening the discussion on recent extensive cutaneous burns at the 46th Congress of the French Surgical Society Duval defined the subject under discussion as including second and third degree burns involving at least a third of the cutaneous surface, and took up the pathology symptoms and treatment during the first four to ten days. Such extensive burns often prove fatal the mortality ranging from 40 to 100 per cent in the most extensive lesions.

The clinical syndrome is that of severe subacute toxemia. There is an initial period of nervous excitability followed by weakness and coma. The secondary symptoms include vomiting, diarrhea and incontinence of the urine and feces. The blood pressure is low and the pulse rapid, the temperature is usually normal or subnormal. Patients with severe burn often die without developing fever but in some cases there is fever with a temperature of from 40° to 41° C. The amount of urine is usually small with much albumin and blood but in some cases the urine is normal both in amount and character and the renal function normal. The cutaneous lesions are variable in some instances all the layers of the skin are totally destroyed, in others the corium is only partially destroyed. In the burned surface there are small areas or 'islands' of normal tissue that make regeneration possible. It is to be noted that the normal skin outside of the burned area shows some of the same characteristics as the burned skin for instance the burned skin and the vesicles that form in the burned area contain an excess of chlorides, so that the normal skin of these patients. The burned skin is toxic in experimental animals its excision saves the life of the burned animals if it is grafted on a normal animal this animal dies. All the organs of the body may show pathological changes in cases of extensive cutaneous burns. Examination of the blood shows hyperglycemia acidosis with diminution of the alkaline reserve, adrenalinemia, hyperleucocytosis, increased concentration of the blood, increased urea and diminished chlorides.

The toxemia in extensive cutaneous burns in the first four days is not complicated by infection but later infection may develop in the burn and complicate the clinical picture. The toxemia resembles to a certain extent the toxemias caused by exogenous toxins but in reality the toxemia of cutaneous burns is caused by toxic substances developed in the burned tissues by the destruction of tissue proteins. Polypeptides and uric acid are present in the blood which is evidence of the abnormal destruction of proteins. The toxemia of cutaneous burns resembles most closely three other conditions traumatic shock resulting from extensive destruction of tissue, postoperative toxemia and roentgen ray or radium toxemia. All these conditions are due to extensive destruction of the patient's own tissues with the production of toxic substances which enter the general circulation. It is possible that the symptoms in some cases of extensive burns may be of the nature of anaphylactic shock but this cannot yet be stated definitely on the basis of either clinical or experimental findings.

Mourgue Molines in discussing the treatment stated that the immediate treatment of a severely burned patient should include the administration of morphine to relieve pain, keeping the patient warm and cardiac tonics. To combat the toxemia administration of fluids is indicated and especially saline solution, isotonic or hypertonic is indicated because of the hypochloremia. Blood transfusions are also of value. Small repeated transfusions of from 250 to 300 c.c. give the best results. Digitalis may often be employed with good effect. Atropin and calcium chloride are suggested for their action on the vegetative nervous system. Sodium hypophosphite is recommended for its action on sulphur metabolism and in some instances adrenal extracts are indicated. In some cases tetanus antitoxin or anti-streptococcus serum may be indicated as a prophylactic against subsequent infection.

In regard to the local treatment the author does not approve of the use of fatty substances such as oils as while they relieve pain, they favor toxic absorption. To prevent toxic absorption on careful cleansing of the burned area is indicated but surgical excision of the burned tissue is rarely possible in extensive burns. The continuous bath is dangerous because of its depressing action on the heart. The author considers that desiccation is the method of choice either by exposure to air with or without a hot tent or by the application of tannic acid or such substances as silver nitrate, gentian violet or mercurochrome. In extensive burns of the trunk the author has found the combination of tannic acid and silver nitrate proposed by Bettman very useful. While tannic acid gives good results in burns of the second degree in third degree burns he believes the resulting coagulum is too thick and rigid. In such deep burns he prefers the use of gentian violet or mercurochrome. If no infection supervenes general treatment can usually be discontinued gradually. In burns of the second degree, the crusts formed over

the burned area usually fall off spontaneously. In burns of the third degree, the crusts must be removed by the application of wet saline or Dakin solution dressing for twenty-four hours. Often skin grafting is necessary after a brief preparation of the field with ultra-violet irradiation.

In the discussion, a number of surgeons reported favorable results with the tannic-acid treatment of burns
ALICE M. MEYERS

Maier, R. L.: Human Bite Infections of the Hand.
Ann Surg, 1937, 106 423.

At Bellevue Hospital the author collected a series of 17 human bite injuries to the hand in a year.

Such injuries are usually sustained in a fist fight and involve the knuckles on the dorsum of the hand.

The author believes the resulting infections and complications are due to an injury to the underlying and moving tendon or to penetration of the joint. The injured extensor tendon may retract proximally from the site of laceration of the skin and is often neglected. Any effective treatment must take into account the possibility of the retraction of the tendon or injury to the joint. Local treatment to the skin laceration alone may be disastrous.

The course of the infection following such injuries is quite uniform. If the extensor tendon is injured, the infection will extend proximally along the course of the tendon on the dorsal surface of the hand as an ascending infection. Sloughing of the tendons may result. If both the tendon and capsule of the metacarpophalangeal joint are injured, in addition to infection along the tendon, the joint may become infected and point into the palm or involve the flexor tendons.

The results obtained in these infections are directly proportional to the time elapsing between the receipt of injury and the institution of adequate care. Prompt and adequate treatment is necessary to prevent crippling deformities.

Cultures, both aerobic and anaerobic, usually show a mixed culture, with the Vincent organism predominating.

The most effective treatment in this type of injury is a thorough debridement of the injured area under a bloodless field. A careful examination of the underlying tendon is made for any evidence of injury or infection. All tissue even suggestive of infection is removed. If evidence of extension into the palm exists, it should be opened widely at this time. Salvarsan is then applied to the wound, which is packed with plain or iodoform gauze. Salvarsan is applied daily for two or three days and at each dressing the wound is irrigated with hydrogen peroxide. The dressings are kept wet with boric acid or magnesium-sulphate solution.

If, after careful examination of the patient, conservative treatment is decided upon, the patient should be carefully but continuously observed for twenty-four hours, in this time the infection will manifest itself and radical treatment can be instituted.
HARVEY S. ALLEN, M.D.

Bigger, J. W.: The Staphylococci Pathogenic for Man. *Brit M. J.*, 1937, 2 837.

The outstanding discoveries of the past fifteen years concerning the pathogenic staphylococci pyogenes are reviewed. From the labors of many workers the knowledge is available that staphylococci produce at least three toxins: a, B, and leucocidin, of which the first and last are of importance in relation to human disease, while the rôle of the B toxin is less certain. The antitoxins to these can be titrated in the blood sera of men and animals, whether normal, infected, or immunized. It is possible actively to immunize men and animals against these toxins, and for the treatment of human disease the antitoxic sera of immunized animals may be used. Coagulase, another soluble product of most staphylococci, does not cause clotting of the plasma in many specimens of human blood, probably because of the presence of anticoagulase. Attempts to devise satisfactory skin tests have been complicated by the fact that most human beings give positive reactions. There is a surprising absence in recent literature of any mention of opsonins, the author, however, hesitates to reject them completely.

The essential of treatment of staphylococcal infection should be rest and lack of interference. This inactive treatment applies to boils and carbuncles wherever situated and not merely to infections about the face. Incision should be made only when liquefaction has occurred. When general symptoms are marked or the local lesion is extensive, antitoxic serum should be used. In chronic and recurring infections it is important to search for a primary infection which is often present in the nose, to investigate the sugar metabolism, and to produce active immunization with toxoid containing the three elements described, with an average of eight gradually increasing injections. The author believes that vaccines should not be entirely abandoned since they may help to establish an antibacterial immunity. He, therefore, suggests the use of both toxoid and autogenous vaccine in which the cocci have been washed free of toxin and toxoid.

Food poisoning due to pathogenic staphylococci receives mention. The source of the organisms which have multiplied in the food and there formed toxins is reported to have been either the human skin or cow's milk.
WALTER H. NADLER, M.D.

Gottesbueren, H.: Gas Gangrene following Amputation for Trophic Ulcers (Gaseodemerkkrankung nach Amputation wegen trophischer Geschwüre). *Zentralbl f. Chir.*, 1937, p. 1929.

Zeissler and Stockenius have recently reported 14 sudden and unexpected deaths from gas gangrene from various portals of entry. This is hardly to be wondered at as the Fraenkel bacillus is found constantly in the earth as well as in the animal and human intestine. It is almost constantly present in wounds and necroses. Nevertheless, the carriers are only rarely infected. Franz estimated the frequency during the World War at 0.5 per cent, and the French

Sanitary Report gave it as 0.46 per cent. The latent infection is noteworthy. Infection did not occur when the projectile entered the body but followed its removal. The longest period of latency was eighteen years. The operations, however, were in the traumatized areas. It is a new finding that infection can occur when the operation is in a distant part of the body. Konjetany reported a case.

Fifteen years previously the patient had received a gunshot wound of the leg. Because of torpid trophic ulcers on the foot amputation was performed in the midcalf. Three days later gas gangrene was demonstrated both clinically and bacteriologically. Recovery followed amputation of the thigh and the administration of gas serum.

The author reports two additional cases. The first was that of a man sixty-one years old who had had an amputation of the left thigh for arteriosclerosis and diabetes in 1933. In 1935 cyanosis of the right great toe was found. The toe was disarticulated because of the refusal of a higher amputation. The necrosis continued. Midcalf amputation was performed, as again higher amputation was refused. Two days later gas edema from Fraenkel bacilli was found. High thigh amputation and gas serum produced a cure.

The second case was a thirty-nine year old man with a large ulcer on the dorsum of the foot following an endarteritis obliterans. Sympathectomy was without result. Therefore amputation was performed in the midcalf area. After four days typical gas edema from the Fraenkel bacillus was found. Healing followed the use of serum and incisions.

That there are gas bacilli present in torpid ulcers has been shown by Biengold, Zeissler and Maussion. All the patients had the same disturbance of the circulation. Injured patients in whom there is an injury to the blood vessels are especially prone to gas edema. Franz has shown that 27 per cent of such injured present gas edema. It was also noted in the war that some patients developed the disease following ligation of the popliteal artery. Therefore, in amputations performed for ulcerations caused by thromboses, endarteritis obliterans or arteriosclerosis a prophylactic dose of gas serum should be administered. Should the disease set in in spite of this serum therapy should be energetically pursued.

(FRANZ) WILLIAM C. BELK, M.D.

Lower W. E. and Tormey T. W. Jr. Gas Gangrene and Its Treatment. *Surg Clin North Am* 1937 17 1385

The authors review our present knowledge of the cause, diagnosis and treatment of gas gangrene.

The spore forming anaerobic bacteria causing gas gangrene occur in the soil, dirt of the street on the skin and in the intestinal tracts of man and animals. The infections are usually mixed with the ordinary pyogenic organisms such as the staphylococcus or streptococcus. The incubation period is from one to four days. Gas is believed to be produced in the tissues by the fermentation of glycogen.

Clinically pain is out of proportion to the severity of the injury, probably due to the pressure of the gas. Crepitation may be elicited; gas bubbles seen if the wound is open and the odor is distinguishable. Smears show a gram positive rod shaped bacillus. X rays may show the muscle bundles more clearly than normally because of the presence of the gas. The temperature may rise to 102° F.

Before the advent of serum therapy the mortality was about 50 per cent; at present it is from 17 to 20 per cent.

Prophylactic treatment consists in immediate thorough cleaning and debridement of wounds suspected of contamination. Particular stress is laid upon the removal of non viable tissue and foreign objects.

Wounds which cannot be closed because of deep pockets or dead spaces are treated by irrigation with potassium permanganate, hydrogen peroxide or some other antiseptic.

Amputation of an extremity is advised if the circulation is hopelessly damaged.

Four thousand units of polyvalent gas bacillus antitoxin combined with 1,300 units of tetanus antitoxin are given to every patient with extensive or suspicious wounds. This dose may be repeated in from four to six hours. Patients should be tested for sensitivity before the administration. General supportive measures must not be neglected.

Curative treatment must be prompt and is started with from 10,000 to 20,000 units of antitoxin given intravenously or intramuscularly and this is repeated from every four to six hours until 100,000 units have been given.

Incisions should be made in line with the skin fold and the muscles separated in line with their fibers. Necrotic and injured tissue is excised. Opening the wound to the air and exposing dead spaces for irrigation is particularly important. Tissues infected following parenteral medication or fluids are best treated by thorough and through irrigation with hydrogen peroxide. X ray has been reported as efficacious possibly because of the liberation of hydrogen peroxide in the tissues.

THOMAS C. DOUGLASS, M.D.

POTENTIAL DANGERS OF THOROTRAST AS A CONTRAST AGENT IN ROENTGEN DIAGNOSIS

Collective Review

WILLIAM H STEWART M D , and FRANCIS H GHISELIN, M D , New York, New York

THE original work on thorium dioxide sol for the roentgenographic visualization of the liver and spleen was done by Oka who published an article in German in 1928. A second communication, published in 1930 (7), stated that his conclusions at that time were that the described method of lenography was of practical value and that the results were dependent upon the deposition of thorium particles in the cells of the reticulo-endothelial system. He stated that he had conducted many animal experiments and concluded that the method was practical. He had administered thorotrast to 6 normal patients in doses of from 0.7 to 15 gm of thorium dioxide per kgm. of body weight and obtained satisfactory shadows of the spleen. He believed that much larger doses were necessary for the demonstration of the liver and found that immediate reactions occurred which included fever and diarrhea. He stated that these immediate reactions should not be seriously considered as they usually did not occur. Since that time several workers used thorotrast as a diagnostic medium in large groups of cases.

Rigler, Kouchy, and Abraham (8) reported 175 cases in *Radiology* in 1935 and Yater (13) and his associates reported a group of over 200 cases in *Radiology* in 1936. In a five-year period Yater had given a stabilized colloidal solution containing approximately 22 per cent of the metal by volume. The administration had been intravenous in divided doses of 25 ccm. on successive days. The amount of the solution injected contained radio-active material equivalent in alpha radiation to from 1.5 to 3.0 micrograms of radium. The authors believe, however, that the beta and gamma radiations are not present in significant quantities. A five-year observation of many of their cases has shown large quantities of thorium retained in the tissues for that period of time. An analysis of the series failed to show any significant immediate reactions. These authors speak very highly of the diagnostic value of the procedure and consider that this procedure was particularly valuable in: (1) differentiation of a mass in the upper abdomen from the liver and spleen, (2)

diagnosis of cirrhosis of the liver when fibrotic replacements displaced the Kupfer cells and caused areas of decreased density in the shadow of the liver, (3) syphilitic cirrhosis (hepar lobatum), (4) metastatic nodules in the liver, (5) primary carcinoma of the liver, (6) abscess of the liver (1 case), (7) cysts, (8) amyloidosis, in other diseases, such as hepatitis, ruptured spleen, and ascites, and in determination of the position of the diaphragm.

Yater now has 47 patients living who have received thorotrast. Their ages range from three to seventy-four years. Fourteen of these patients had been injected with thorium more than four years previous to the time of the report. The author states that not one of the patients had either symptoms or physical signs that could be attributed to the presence of the drug. A further observation was made by Yater which may have a significant bearing on the ultimate fate of the thorium used in this diagnostic procedure. Twenty-two of the patients who were re-examined showed evidence of mobilization of the opaque medium. The shadows of the liver and spleen appeared mottled and a portion of the thorium had shifted its position from the liver and spleen to the abdominal lymph nodes in 14 cases. The time necessary for this mobilization to occur was variable. The shortest period noted was thirteen months, and 1 patient had gone for almost five years without any apparent change in the appearance of the shadows that would indicate migration of the thorium particles. Rigler, Kouchy, and Abraham (8) reported almost similar findings in their review of 175 cases.

There can be little question as to the amount of information which can be obtained from this procedure. All who have used it have reported satisfactory shadows of the spleen and liver and found that a high degree of diagnostic accuracy can be obtained. The question of the continued use of the procedure is now entirely dependent upon the possibility of toxicity arising from the radio-activity of the ingested thorium.

Leipert (4) has made a determination of the amount of thorium retained in the body following

injection The organs of 3 patients were examined at autopsy and he reported as follows

A man who died two days after the injection showed that 64.3 per cent of the amount injected was retained in the abdominal organs. The second patient showed 56.9 per cent four days after injection and the third patient showed 97 per cent sixty days after injection. Determination in rabbits showed 48.5 per cent twenty-eight days after injection, 98.8 per cent sixty-seven days after injection and 70.9 per cent ninety-one days after injection. These figures indicate that a relatively high percentage of thorium is retained in the body.

A considerable amount of experimental work has been done in an attempt to determine the possible danger due to the radio-activity of the thorium.

Roussy, Oberling, and Guerin (10) injected 50 rats with 1 c cm of thorotrast every three or four days till a total of 5 c cm was reached. Fifteen of these rats developed tumors in a period of from twelve to eighteen months. Of 5 rats who received subcutaneous injections, 4 developed sarcomas at the site of the injection. It was noted that the sarcomatous changes appeared in close relation to the deposits of thorotrast.

Selbie (11) repeated these experiments with 60 rats. He found that histological spindle-cell sarcomas occurred in 33 per cent. Of sixty mice which received similar injections 12 per cent developed tumors.

The danger of delayed reactions resulting from the radio-activity of thorotrast has been studied by Taft (12). In carefully controlled experiments in which the radio-activity was determined by means of the Geiger counter, he was able to demonstrate that the usual dose, 75 c cm, had a radio-activity equivalent to that of 1.37 micrograms of radium element. He refers to the experiences of Martland (5, 6) who found in a review of autopsies performed on patients dying of acute radium poisoning a minimum of 14.0 micrograms of radium element radiation in the body. Martland reported, however, that a quantity as small as 2.0 micrograms of radium element was sufficient to cause severe radium poisoning. Taft is of the opinion that even the equivalent of 1.37 micrograms of radio-active element which is retained in the body as thorotrast may, in the course of time, produce symptoms of poisoning.

Yater is of the opinion that the absence of any signs or symptoms referable to the radio-activity of thorium dioxide is proof of its harmlessness. Selbie, however, has pointed out that Martland's work on radium poisoning proves that even in the presence of large quantities of radio-active mate-

rial symptoms did not occur for at least seven years, a period longer than any thorotrast patient has been under observation.

Robins and Goldberg (9) state, concerning elimination, that neither the route nor the rate of elimination has been determined and quote Leiper (4) who was able to demonstrate the retention of thorotrast in tissues over a considerable period. The only evidence that Robins and Goldberg were able to report that indicated that the thorium may be eliminated was a slight decrease in the density of the shadows of the liver and spleen in rabbits the same time that dense granules, presumably thorotrast, were making their appearance in the gastro-intestinal tract. They conclude that while the test is of diagnostic value the potential dangers restrict its use to patients in the middle and older age groups until all question of delayed toxic reactions have been ruled out.

Kadrnka and Junet (3), in experimental work on rabbits, demonstrated that large doses of thorium which cannot be taken care of by the liver and spleen are deposited in the lungs. At first a fine mesh like distribution was noted, later a more coarse distribution was seen which outlined the lobular elements of the lungs. Rabbits receiving these doses showed no evidence of injury in a period of observation lasting three years.

Gilbert, Jupel, and Kadrnka (2) made experimental studies with rabbits. Radiation with x-rays was given which demonstrated a destruction of the liver cells when thorotrast was present which destruction was not caused by similar doses in rabbits who did not have thorotrast deposited in the liver reticulo-endothelial system.

Cooke (1) reviewed the literature in 1934 and stated that most men are in agreement that thorotrast is eliminated very slowly, if at all, and that no active elimination can be determined in rabbits. Experimental work of his own demonstrated that daily injections of several substances including 0.9 per cent saline solution, 5 per cent calcium chloride, 10 per cent dextrose, and 0.25 c cm of typhoid vaccine or epinephrin, would cause no measurable amount of elimination.

In 1937 we reported the cases of 8 patients to whom thorium dioxide sol or thorotrast had been administered intravenously as a diagnostic agent. Of these 7 were dead as the result of pre-existing disease at the time of the writing of that article. Since that time thorotrast was given to 6 more patients and of the entire group only 2 are now living.

In a previous communication the following observations were suggested as contra-indications to the indiscriminate use of this material:

1 The diagnostic value was definitely limited, because of the lack of clear detail in the shadows of the liver and spleen.

2 Immediate reactions, such as vomiting, subcutaneous hemorrhages, and fever, occurred on account of the toxicity of the drug in a considerable number of the cases

3 No tendency to eliminate the thorotrast once deposited in the liver and spleen was noted in observations over a long period of time.

4 Signs of radio-activity of the ingested drug were shown by exposure of a photographic plate left over night in contact with a spleen which had been removed at autopsy from a patient who had received the thorotrast. A control spleen showed no such evidence of radio-activity

At this time there is little to add to the story. We have followed the 2 remaining cases for a period of more than five years. Roentgen examinations made this year demonstrated that the opaque material is still retained in the liver and spleen. In neither patient has the density decreased appreciably, although we noted that at the most recent examination of one of our subjects the shadow of the thorotrast in the spleen showed a moderate degree of dissolution. Some of the opaque material had migrated to the lymph nodes so that they appeared in some profusion both in groups and following the chain up and down the spine. This migration is a new observation and explodes the theory that once thorotrast is deposited in the reticulo-endothelial system it never moves. The questions now are: To what extent does this migration occur? Is the radio-activity increased by the accumulation of thorotrast in the lymph nodes? and, Is the potential danger increased or decreased by this concentration in these nodes?

As yet no ill effects definitely referable to the thorium injections have been manifest. Possible dangers arising from the retention of a radio-

active element in the body, however, have been well demonstrated, and the long period intervening between the ingestion of the element and the onset of symptoms is well known. For this reason, it is much too early as yet to dismiss this consideration

Our early observations have been amply confirmed by Taft, Reeves and Morgan, and others, who have used the Geiger counter to directly measure the amount of radio-activity in living subjects. Further investigation along this line, as well as continued observation of the subjects who have received the drug, will in time give a definite answer to the problem

For the present we must conclude that the intravenous use of thorium dioxide sol (thorotrast) as a diagnostic agent in the diseases of the liver and spleen is of limited value and is at least a potential source of danger.

It is our belief that careful consideration of the limitations and the dangers of this drug justify its use in only a few cases.

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PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Dahl B. The Inhibiting Effect of Roentgen Rays on the Formation of Callus (Nouvelles recherches sur l'effet inhibiteur des rayons de Roentgen sur la formation de cal) *Acta radiol* 1937 18 365

In previous experiments on young rats Dahl found that a dose of roentgen rays over the tibia of the hind leg which caused a temporary exudative lesion of the skin followed by permanent loss of hair was sufficient to suppress the development of callus in a subsequent fracture. If the skin lesion was less marked and followed by regrowth of hair formation of callus was retarded and the callus was weak.

In these experiments the bone was fractured within two months after irradiation, i.e., while the rats were still young. Observation of many laboratory animals has shown that the sexual life of rats declines when they are eighteen months old, and the age of eighteen months in these animals corresponds to the age of fifty years in man. In the series of experiments reported in this article the rats were irradiated at the age of three months but the tibia was not fractured until the animal was eighteen months of age and appeared old. In comparing the effect of the irradiation on callus formation in relation to the degree of skin reaction it was found that callus formation was more definitely inhibited with the lesser degrees of cutaneous reaction in these aged rats than in young animals. With the more marked degrees of cutaneous reaction callus formation was inhibited in both the younger and the older animals.

In another series of experiments the rats were not irradiated until they were eighteen months of age; the leg was fractured a month and a half later. In some of these rats the effect on osteogenesis was much the same in relation to the cutaneous reaction as in young animals; in others osteogenesis was inhibited to a greater degree than in young animals with a similar cutaneous reaction.

In general it may be concluded that the osteogenic tissue in aged animals is more radiosensitive than in young animals. This is due undoubtedly to the fact that with advancing age the regeneration of bone becomes more difficult and may be further inhibited by other unfavorable factors such as roentgen ray irradiation. In these experiments it has been noted that when callus formation is inhibited the bony tissue of the diaphysis is replaced by a connective tissue as in osteitis fibrosa. There may also be a formation of fibrous bone in the marrow cavity with a certain resemblance to bone formation in Paget's disease. ALICE M. MEYER

Coutard H. Results and Methods of Treatment of Cancer by Radiation *Ann Surg* 1937 106 584

Coutard first pays tribute to a number of eminent American surgeons who greatly contributed to the

progress of operative technique which led to improved results in the treatment of cancer, as for example Halsted, the Majors, Cushing, Crile, Graham and Bloodgood.

Radiotherapy has developed more slowly but has nevertheless produced definite cures in cases in curable by surgery. The chief difficulty of irradiation lies in the fact that not all histological forms or localizations of the cancer respond equally. It appears in this respect that a classification according to the anatomical origin of the neoplasm serves a much better prognostic purpose. A knowledge of the degree of differentiation of the tumor cells and of the fibrosclerotic transformation of the vasculonecrotic tissue is of particular value.

The author gives a group of statistics of cases treated in various services of the Curie Institute by roentgen therapy alone or by combined radium and roentgen irradiation (in diseases of the uterus) or by a combination of radium and surgery (in diseases of the tongue and antrum). The five year survival rates are as follows: (a) 34 per cent of 46 cases of lymphosarcoma of the pharynx; (b) 32 per cent of 66 cases of epithelioma of the palatoglossal region; (c) 24 per cent of 126 cases of epithelioma of the larynx; and 11 per cent of 225 cases of epithelioma of the pharynx; (d) 50 per cent of only 8 cases of epithelioma of the maxillary sinus; (e) 31 per cent of 64 cases of epithelioma of the cervix uteri; (f) 18 per cent of 382 cases of epithelioma of the tongue; and 35 per cent of 112 cases of very advanced conditions in which roentgen therapy alone could be used.

If one considers the source of energy, two general methods of irradiation exist: (1) irradiation from an internal source as for example radium puncture of carcinoma of the tongue or palate, intraoral radium mouldage of carcinoma of the buccal lips, or floor of the mouth, and intracavitary radium applications of carcinoma of the uterus; and (2) irradiation from an external source as for example roentgen therapy and telecurie therapy. Generally speaking, irradiation from an internal source can be used particularly in the treatment of cancer of differentiated cells of small volume and without adenopathy. Irradiation from an external source can be used in the treatment of extensive lesions accompanied by adenopathy when the cells are undifferentiated or only slightly differentiated and when the vasculoconnective tissue is soft, loose, elastic, non-fibrous and not penetrated by muscular fibers. Internal irradiation is carried out as a rule with a high dose in several days, whereas in external irradiation the method of continuous treatment over a longer period is recommended as for example treatment with daily doses of from 200 to 250 roentgens until a total cutaneous dose as high as 7,000 roentgens is reached.

The cure of adenocarcinoma by irradiation is considerably more difficult than that of stratified

epidermoid epithelioma, therefore, operation is advised whenever it is technically or biologically indicated. Likewise, cervical adenopathies receive more benefit from surgery than from irradiation.

According to the consensus of surgical opinion, all movable cancers, or all movable lymph nodes, are operable and must be removed surgically. However, if one considers the biological indications, in addition to the technical, this opinion may suffer considerable modification. Thus, the more embryonal the neoplastic cell, as in lymphosarcoma or very undifferentiated epithelioma, the greater the probability of its dissemination and thus the less chance for a cure by operation, whereas radiation therapy may lead to a good result. On the other hand, cancers consisting of differentiated cells developing on fibrosclerotic connective tissue are radioresistant and should be treated by surgery alone. Between these extremes, there are a large number of intermediate groups in which a combination of the two methods is advised. In any combination of surgery and irradiation therapy it is more efficacious to precede rather than to follow the surgery by irradiation.

T. LEUCUTIA, M.D.

Wintz, H.: Postoperative Irradiation Treatment of Carcinoma (Zur Strahlenbehandlung des Carcinoms nach der Operation) *Strahlentherapie*, 1937, 59 305

The author disapproves of the vagueness of the terms used in describing the roentgen treatment of carcinoma, and the faulty evaluations of the different methods by the individual physicians. The purpose of postoperative irradiation is the destruction of the cancerous foci which have not been thoroughly removed. Complete removal of the foci is the goal in most of the cases which have been operated upon. While partial removal of the cancer tissues in the body by operation is of benefit, there is a decreased amount of degeneration upon subsequent irradiation and consequent poison-

ing of the body by the products of degeneration, yet the value of the incomplete operation is questionable. The opening of the blood and lymph channels may, as a fact, lead to a very rapid dissemination and generalization of the cancerous process in the affected organism.

Irradiation of the recurrent cancer promises success only in those cases in which it is certain that there has been no dissemination from the cancer focus. When dissemination has occurred irradiation is not only useless, but harmful.

Prophylactic postoperative irradiation is that by which the transmutation of one or more epithelial cells into true cancer cells is forestalled, the cancer tissue itself having been completely removed by the previous operation. As a rule, however, postoperative irradiation is done because of insufficient operative removal of the foci. If the so-called postoperative prophylactic irradiation proves unsuccessful, it must be assumed that the cancer cells are at the time less sensitive to irradiation, or that cancer cells have been carried back into the irradiated region from outside this area.

Regarding the practical application of postoperative irradiation, the full carcinoma dose may be given at once. However, it is still to be demonstrated if the fractionated method is superior to the one-dose procedure. On the other hand, one can wait until a local recurrence, following what was thought to be a complete removal, demonstrates the need of postoperative irradiation. Better still and preferable under all circumstances is pre-operative irradiation, it has been proved unquestionably that pre-operative irradiation invariably gets results in carcinoma of the breast. Operation by opening-up the blood and lymph channels may induce a dissemination, and if followed by complications the postoperative irradiation treatments may arrive too late. For these reasons such irradiation treatment is of purely limited value.

(G. SCHAEFER) JOHN W. BRENNAN, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Davis H A. Physiological Availability of Fluids in Secondary Shock. *Arch Surg*, 1937 35 461

A study was undertaken to determine the nature and mechanism of the response of normal dogs and of animals in shock to water and electrolytes.

In a control group it was found that the intravenous administration of 0.9 per cent solution of sodium chloride, 5 per cent dextrose and 10 per cent sucrose each produced a rise in metabolism, the highest rates being encountered when dextrose solution was administered. The metabolism was raised from 200 to 300 per cent. However, although saline and sucrose solutions increased the metabolic rate only from 25 to 50 per cent, the rise was sustained longer. Secondary or traumatic shock, on the other hand, was accompanied by a fall of from 30 to 50 per cent in the rate of oxygen consumption.

Further studies by the author seem to indicate the presence of certain physiological and pathological limitations to the free and equal distribution of fluids in the organism in shock. The introduction of fluid into the intact animal produces a dilution of the blood with subsequent diuresis. With larger amounts of fluid the liver cells imbibe water from the blood stream and become edematous ultimately causing compression of the hepatic capillaries. Still later the splenic sinusoids dilate. A transudate of protein laden fluid into the peritoneal cavity occurs. Finally the fluid containing serum albumin and globulin permeates through the capillary walls particularly those of the lungs and leads to pulmonary edema. In secondary shock the normal reservoir action of the blood for fluids is lost and fluid leaves the blood stream more rapidly than in the intact animal. The site of fluid loss is greatest in the region of trauma so that relatively little transudation of fluid occurs into the peritoneum or into the alveoli of the lungs. Evidences of water imbibition are present in the central portions of the hepatic lobules. The production of a lowered rate of oxygen consumption by the administration of fluids in cases of secondary shock does not result from interference with the supply of available oxygen by pulmonary edema. The stimulant action of water on metabolism is exerted only so long as fluid is actually present within the circulatory system and seems to depend on the resultant increase of blood volume or blood flow. The removal of serum albumin and globulin and of blood cells by the fluid introduced into the area of trauma and the peritoneal cavity diminishes the material available for transportation of oxygen and leads to a still greater degree of lack of oxygen.

The author concludes that in traumatic shock a peculiar alteration of the response to fluids exists.

The physiological availability of water is diminished even to the point of actual intolerance. Even the transfusion of blood, as has been pointed out by Zenz and Govaerts, can be harmful. The administration of a quantity of fluid equivalent to from 5 to 12 per cent of the body weight may result in a fall in the metabolic rate. The intact animal on the contrary, may be given fluid to the extent of 25 per cent of the total body weight without any diminution in the rate of oxygen consumption. The anoxemia of traumatic shock is augmented by the administration of fluids, which promote a loss of protein and cells into the traumatized area, into the peritoneal cavity and, to a slight extent into the alveoli of the lungs and general tissue spaces.

JOHN H. GARLOCK M.D.

DUCTLESS GLANDS

Oastler E G. The Pituitary Its Relation to the Endocrine System. *Glasgow M J*, 1937 17 251

The pituitary gland has been shown to occupy an important position in the endocrine system, somewhat in the nature of a modulator affecting and being affected by the other glands found in the system.

The posterior lobe produces pitressin and pitocin. It is probable that these are secreted in the pars nervosa itself and not in the pars intermedia. It is also possible that there is another factor that has a specific effect on the acid bearing area of the stomach.

The pars intermedia produces intermedia or the chromatophorotropic factor, which has a specific action of the melanophores of frogs.

The anterior lobe produces definitely eight and probably nine different factors: gonadotropic (1) follicle-stimulating hormone (2) luteinizing hormone (3) lactogenic, thyrotropic, adrenotropic, diabetogenic, pancreaticotropic (4), ketogenic, parathyrotropic and growth hormone.

gonadotropic factors

The pituitary gland is essential for the proper development of the gonads also for the maturation of the follicles and the phenomenon of estrus, the latter being due to the production of the estrogenic hormone.

Fevold and Ilusaw, in 1933 isolated separate factors from the anterior pituitary which they claimed could bring about follicular maturation and luteinization respectively. The former they called follicle stimulating hormone and the latter luteinizing hormone. The former corresponds to Zondek's Frolan A and is designated by Smith as a gametokinetic principle because it stimulates the male germ cells as well as the ova and granulosa. The luteinizing hormone corresponds to Zondek's Frolan B and there now appears to be very little to differ

entiate it, at least physiologically, from the luteinizing principle in pregnancy urine

Both the follicle-stimulating and luteinizing hormones are increased in amount in certain conditions, and to such a degree that their excretion in the urine can be easily detected and measured by biological methods. The luteinizing hormone is increased during pregnancy and in cases of chorionepithelioma and hydatidiform mole. The follicle-stimulating hormone is increased after the menopause or after castration.

As regards the luteinizing-hormone fraction found in pregnancy urine the situation is entirely different. The human pituitary gland is found to contain no gonadotropic factor at all during pregnancy. This naturally suggests that this fraction must be formed elsewhere, and it now seems probable that it comes from the placenta.

In the male the pituitary gland is responsible for the descent of the testes into the scrotum and for the proper development of both the spermatogenic and interstitial elements, the latter in turn being responsible for the development of the secondary sex organs.

In the young female the ovaries increase in size under the influence of the pituitary gland. It seems probable that both the follicle-stimulating-hormone and the luteinizing-hormone factors play a part, and that under the balanced action of the two the follicles increase in number and in size. At puberty the pituitary gland probably increases its output and thus stimulates the follicles, which in turn produce, in larger amounts, estrin, in the form of the highly active substance estradiol. This result has a stimulating effect on the female secondary sex organs, the uterus, vagina, and breasts, which all enlarge. Under the continued action of the pituitary gland ovulation occurs, and the ruptured follicle becomes invaded by connective tissue and the corpus luteum is formed. This body produces progesterone.

Further complicated interactions ensue depending upon whether or not pregnancy supervenes. If pregnancy does not ensue the corpus luteum degenerates and the output both of estradiol and progesterone falls, which occurrence probably is the determining factor that brings about menstruation. The falling-off in the secretion of the ovarian hormones stimulates the pituitary gland once again and so another cycle is started.

On the other hand, if pregnancy occurs the anterior-pituitary-like substance is produced almost immediately after implantation, from some part of the outer surface of the ovum.

LACTOGENIC FACTOR

An association between the anterior pituitary lobe and a factor essential for lactogenesis was first discovered in 1928 and 1929. The lactogenic factor or prolactin has no effect on the development of mammary tissue. It merely induces the secretion of milk, and can act only on a gland that has first been suitably prepared. Lactation can be brought

about experimentally both in male and female animals by preliminary injections with estrin and progesterone, followed by prolactin.

THYROTROPIC FACTOR

A connection between the pituitary gland and the thyroid has been known to exist clinically for some considerable time. Thyrototoxicosis has been observed repeatedly in cases of acromegaly. In cases of this disease in which the basal metabolic rate was high, removal of a chromophil adenoma has been followed by a fall in the rate almost as uniform and as striking as that seen after thyroidectomy in a case of Grave's disease. On the other hand, Simmond's disease showed the opposite picture, and other types of hypopituitarism have also been shown to be associated with hypothyroidism frequently.

Experimental evidence has shown that hypophysectomy in all sorts of species, such as the tadpole, the dog, and the rat, has been followed by atrophy of involution of the thyroid with an excess of colloid and a low epithelium. The basal metabolic rate fell to as low as minus 35 per cent. These changes could be prevented or repaired by implanting pituitary gland. The opposite effect, hyperplasia of the thyroid, was produced by injections of extract from the anterior pituitary lobe.

ADRENOTROPIC FACTOR

There is considerable clinical evidence of an interrelationship between the adrenal gland and the pituitary gland. Atrophy of the adrenal cortex has been described in cases of hypopituitarism, and cortical hypertrophy in acromegaly.

Experimentally it has been found that after hypophysectomy the adrenal cortex atrophies, the medulla not being affected, and that this atrophy can be prevented or repaired with pituitary implants. It has also been shown that the extraordinary power which the adrenals have for compensatory hypertrophy is lost at once after hypophysectomy. On the other hand, injection of extract from the anterior pituitary lobe has resulted in hypertrophy and increase in weight of the adrenals.

There is also evidence which indicates that the atrophy of the gonads that occurs after removal of the adrenals takes place through the pituitary gland.

DIABETOGENIC FACTOR

The relation between the pituitary gland and diabetes has been recognized for a long time. Glycosuria and fully developed diabetes mellitus are very frequent occurrences in acromegaly. On the other hand, in hypopituitarism the sugar tolerance is much increased, and hypoglycemia may occur, even severe enough to produce serious symptoms.

Houssay was the first to demonstrate the direct relationship between the pituitary gland and the pancreas, and to prove the existence of a diabeto-

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Davis H. A. *Physiological Availability of Fluids in Secondary Shock.* Arch Surg 1937 33: 451

A study was undertaken to determine the nature and mechanism of the response of normal dogs and of animals in shock to water and electrolytes.

In a control group it was found that the intravenous administration of 0.9 per cent solution of sodium chloride, 5 per cent dextrose and 10 per cent sucrose each produced a rise in metabolism; the highest rates being encountered when dextrose solution was administered. The metabolism was raised from 200 to 300 per cent. However although saline and sucrose solutions increased the metabolic rate only from 25 to 30 per cent, the rise was sustained longer. Secondary or traumatic shock, on the other hand was accompanied by a fall of from 30 to 50 per cent in the rate of oxygen consumption.

Further studies by the author seem to indicate the presence of certain physiological and pathological limitations to the free and equal distribution of fluids in the organism in shock. The introduction of fluid into the intact animal produces a dilution of the blood with subsequent distress. With larger amounts of fluid the liver cells imbibe water from the blood stream and become edematous ultimately causing compression of the hepatic capillaries. Still later the splenic sinusoids dilate. A transudate of protein laden fluid into the peritoneal cavity occurs. Finally the fluid containing serum albumin and globulin permeates through the capillary walls particularly those of the lungs and leads to pulmonary edema. In secondary shock the normal reservoir action of the blood for fluids is lost, and fluid leaves the blood stream more rapidly than in the intact animal. The site of fluid loss is greatest in the region of trauma so that relatively little transudation of fluid occurs into the peritoneum or into the alveoli of the lungs. Evidences of water imbibition are present in the central portions of the hepatic lobules. The production of a lowered rate of oxygen consumption by the administration of fluids in cases of secondary shock does not result from interference with the supply of available oxygen by pulmonary edema. The stimulant action of water on metabolism is exerted only so long as fluid is actually present within the circulatory system and seems to depend on the resultant increase of blood volume or blood flow. The removal of serum albumin and globulin and of blood cells by the fluid introduced into the area of trauma and the peritoneal cavity diminishes the material available for transportation of oxygen and leads to a still greater degree of lack of oxygen.

The author concludes that in traumatic shock a peculiar alteration of the response to fluids exists.

The physiological availability of water is diminished even to the point of actual intolerance. Even the transfusion of blood as has been pointed out by Zinn and Govaerts, can be harmful. The administration of a quantity of fluid equivalent to from 5 to 12 per cent of the body weight may result in a fall in the metabolic rate. The intact animal, on the contrary, may be given fluid to the extent of 25 per cent of the total body weight without any diminution in the rate of oxygen consumption. The anoxemia of traumatic shock is augmented by the administration of fluids, which promote a loss of protein and cells into the traumatized area into the peritoneal cavity and to a slight extent into the alveoli of the lungs and general tissue spaces.

JOHN H. GARLOCK, M.D.

DUCTLESS GLANDS

Ossier, L. G. *The Pituitary Its Relation to the Endocrine System.* Glascow M. J., 1933 11: 133

The pituitary gland has been shown to occupy an important position in the endocrine system, somewhat in the nature of a modulator affecting and being affected by the other glands found in the system.

The posterior lobe produces pituitrin and probably also a substance secreted in the pars nervosa itself and not in the pars intermedia. It is also possible that there is another factor that has a specific effect on the acid bearing area of the stomach.

The pars intermedia produces intermedia, or the chromatophorotropic factor which has a regressive action of the melanophores of frogs.

The anterior lobe produces definitely eight and probably nine different factors: gonadotropic (1) follicle-stimulating hormone (2) luteinizing hormone (3) lactogenic (4) thyrotropic (5) adrenotropic (6) diabetogenic (7) pancreatotropic (8) ketogenic (9) parathyrotropic and growth hormone.

GNADOTROPIC FACTORS

The pituitary gland is essential for the proper development of the gonads also for the maturation of the follicles and the phenomenon of estrus, the latter being due to the production of the estrogenic hormone.

Fervid and Hsiao in 1933 isolated separate factors from the anterior pituitary which they claimed could bring about follicular maturation and luteinization respectively. The former they called follicle-stimulating hormone and the latter luteinizing hormone. The former corresponds to Zondek's Prokin A and is designated by Smith as a gametokinetic principle because it stimulates the male germ cells as well as the ova and granulosa. The luteinizing hormone corresponds to Zondek's Prokin B and there now appears to be very little to differ

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SURGERY AND THE BASIC SCIENCES

THE APPLICATION OF RECENT CONTRIBUTIONS IN BASIC MEDICAL SCIENCES TO SURGICAL PRACTICE

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STOMACH

THE effect of drugs on the stomach is always of interest because of its possible therapeutic application in the treatment of gastric complaints, and also because the physician desires to know the effect of drugs on the stomach when given for any other purpose. Several papers have appeared recently which describe the effect of various drugs on gastric motility. Van Liere, Lough, and Sleeth (1) who employed a barium meal and fluoroscopy in human subjects report that ephedrine delayed the gastric emptying time 92 per cent. Using the same technique, Van Liere and Sleeth (2) found that benzedrine produced only a 28 per cent delay. Beyer and Meek (3) studied the action of benzedrine in more detail in dogs, using the intra-gastric balloon method as well as fluoroscopy. They observed that the drug produced an early but temporary increase in motility followed by a more prolonged, complete inhibition of movements. These changes were reflected in the emptying time. Although gastric evacuation was increased at first, the total emptying time was prolonged. This would indicate that if a person were to inhale benzedrine too frequently after eating, a certain amount of gastric retention might result.

Quigley (4), who employed the balloon method in human subjects, reports that 0.65 mgm of atropine or 1.5 mgm of homatropine completely abolished gastric hypermotility which had been

produced by the administration of from 20 to 30 units of insulin. It has been known for several years that insulin produces hypermotility by means of vagal impulses liberated by the brain centers in response to the lowered blood sugar (Quigley and Templeton, 5). Veach (6) reports that morphine increases the motility of the human stomach, whereas atropine has an inhibitory action. For this reason he suggests that in gastric hemorrhage atropine should be used instead of morphine, and that restlessness should be controlled by sedatives other than morphine.

Barron and Curtis (7) have determined the effect of splanchnic resection on gastric motility in human subjects. After bilateral resection there was a marked increase in the duration of periods of motility and a definite increase in the number and amplitude of the contractions. This effect was still manifested after seven months. The total emptying time of the stomach was not affected by unilateral resection, bilateral resection, however, caused the stomach to empty more rapidly. The average emptying time was one hour and fifteen minutes less than before operation. This was undoubtedly the effect of removal of the inhibitory effect of the sympathetics on gastric motility.

When the vagi in man are sectioned, the results are similar to those seen in the dog. The motility and tone are diminished and the rate of evacuation is slowed. Later, motility may improve, but solid food is more slowly evacuated as late as one year postoperatively. Barron, Curtis, and Haverfield (8) sectioned the left vagus in a

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genic factor with an antagonistic action to insulin. Houssay showed that whereas a pancreatectomized animal developed diabetes and died, an animal whose pituitary gland was removed previously, or at the same time, failed to develop severe diabetes. The diabetogenic factor is quite independent of the thyroid, the adrenals, or the gonads, since it acts in the absence of all these glands. It has been separated from the thyrotropic factor and also from what is known as the ketogenic factor.

The way in which this factor acts is obscure; its presence appears to be necessary for the action of adrenalin in discharging glycogen from the liver.

PANCREATOTROPIC FACTOR

The existence of a pancreaticotropic factor with a direct stimulating effect on the islets of Langerhans is extremely doubtful, and the general opinion at present appears to be that there is no adequate proof of its existence.

KETOGENIC FACTOR

It has been shown that an injection of an alkaline extract of the anterior lobe of the pituitary into animals kept on a fat diet resulted in a temporary increase in the excretion of acetone by the urine and an increase in the ketone bodies in the blood. It is now generally agreed that the effects are due to a specific hormone, orophysis or the ketogenic hormone or factor.

This hormone is usually found together with the thyrotropic principle in the preparation of extracts of the anterior pituitary lobe, but it appears to be quite separate from the latter and is quite distinct from the diabetogenic factor both chemically and in its biological actions.

PARATHYROTROPIC FACTOR

The existence of a parathyrotropic factor is suggestive but not yet definitely proved. A possible relationship between the pituitary gland and the parathyroids is suggested by the descriptions in the literature of cases of pituitary basophilism. Many

of the clinical signs and pathological findings in pituitary basophilism suggest a close resemblance to the condition of hyperparathyroidism.

GROWTH HORMONE

Growth and the pituitary gland have been connected ever since Marie showed that acromegaly was associated with pituitary disease. One of the most obvious effects of hypophysectomy in young animals is the cessation of growth immediately after the pituitary gland has been removed. It is now known that these effects are due to a specific hormone in the anterior lobe. Pituitary extracts will maintain growth in young animals after hypophysectomy, but will have little or no effect on the atrophy of the other glands. If administered to normal animals, great acceleration of growth results, and in the rat, an animal whose epiphyses remain open for a very long time, veritable giants have been produced.

ANTITROPIC FACTORS

It has been observed that repeated injections of a tropic factor will soon result in a diminution of the original stimulating effect and eventually in hypoplasia. This was first noted in respect to the thyrotropic factor, and later the gonadotropic and others. It is not known where these inhibitory substances are formed, but since they can be developed in hypophysectomized animals, they cannot come from the pituitary gland.

Collip believes that these inhibitory substances are true antitropic hormones and states that he has found them occurring spontaneously. He has suggested that they probably exist normally in the body but that they cannot be detected until they exceed the hormone substance with which they are balanced.

This conception of Collip's is by no means universally accepted. Many investigators consider that these inhibitory substances are of the nature of antibodies and can be explained on an immunological basis. J. THORNTON WILKINSON, M.D.

secretion of mucus and because of its effect of improving gastro-intestinal muscular tone, but one must not overlook deleterious or disagreeable accompanying reactions, as are so frequently observed after the administration of atropine

In a series of papers, Wilhelmj and his co-workers (14, 14a) have investigated the effect of acid in the stomach and in the intestine on the acidity of secreted gastric juice. They have found that acid operating from within the stomach has very little inhibitory effect, although acid in the duodenum can normally decrease gastric acidity significantly. The inhibitory effect of acid in the duodenum is inversely related to the strength of the gastric secretory stimulus. For example, the inhibition against the gastric phase of secretion is greater than that against the cephalic phase or against histamine. These investigators have been concerned with the acidity of the juice only. Griffiths (15), Day and Webster (16), and Crider and Thomas (17) have all obtained evidence which indicates that the presence of acid in the duodenum exerts an inhibitory action on the rate of secretion of gastric juice. One cannot help but wonder what has happened to this mechanism in those patients with duodenal

ulcer who manifest a hypersecretion. It has also been shown that the presence of acid in the duodenum relaxes the pyloric sphincter and the stomach (Thomas, Crider, and Mogan, 18), a condition which would favor regurgitation. It is very possible that the acidity of the gastric contents is regulated by a coordination of these two processes, they must be in part concerned.

The inhibitory effect of acid may in part be responsible for the observation of Hardy and Quanstrom (19). They found that in dogs with an obstructed jejunum, continuous gastric drainage by the Wangenstein technique resulted in a greater volume of gastric secretion than intermittent drainage. They attributed their observation to the effect of distention, but the volumes of juice were probably too small to produce much distention. These authors make the significant observation that when continuous drainage is used in patients, the mineral loss is greater and should be carefully controlled.

Chang (20) reports that the administration of histidine (larostidin) to patients with ulcer had no effect on the volume, the quantity of hydrochloric acid, or the acidity of gastric secretion. Likewise no therapeutic effects were obtained.

LIVER

The effects of hepatectomy in the dog have been studied in detail by Mann (21). Recently this type of experiment has been extended to the monkey, an animal which more closely resembles man. Maddock and Svedberg (22) report that hepatectomized monkeys survive complete removal of the liver for from ten to seventeen hours if the blood sugar is maintained by the administration of glucose. In these animals urine formation was decreased, sometimes to complete anuria. The blood sugar dropped very rapidly, from 88 mgm per cent to 30 mgm per cent in the first postoperative hour. The blood urea remained constant or fell to less than half of the pre-operative level, and depended on the degree of anuria. Amino-acids, uric acid, and bilirubin accumulated in the blood. The non-protein nitrogen increased on an average of 50 per cent, the rise being most marked in those animals which appeared to be in poor condition. The rise in uric acid is interesting in the light of the yellow-fever experiments of Wakeman and Morrell (23) who found no rise of uric acid in animals dying of the disease. It is apparent that even though histologically no normal-looking liver tissue remains, there may still be a sufficient number of cells present capable of maintaining some of the function of the organ.

Svedberg, Maddock, and Drury (24) have studied this problem in more detail in hepatectomized rabbits, some of which were also nephrectomized or eviscerated. The rabbits showed a marked rise in non-protein nitrogen, a large proportion of which was due to creatin. Evisceration exaggerated the rise in non-protein nitrogen and creatin, which indicated that these rises were not of visceral origin. The hepatectomized animals showed a much greater increase in the unidentified portion of the non-protein nitrogen than simple nephrectomized animals. That these substances were of visceral origin was indicated by the fact that they did not increase in the hepatectomized eviscerated animals. Their absence might account for the consistently longer life of the eviscerated hepatectomized animals. Other than this suggestion, very little is known about the actual cause of death after failure or removal of the liver.

Allen, Bowie, McCleod, and Robinson (25) in 1924 observed that depancreatized dogs maintained on insulin developed severe fatty degeneration of the liver. This condition could be prevented by including raw pancreas in the diet. In 1933, Best, Ferguson and Hershey (26) demonstrated that the active constituent of raw pan-

patient who manifested hypertonus and delayed evacuation of the stomach presumably due to 'vagotonia'. After the operation the hypertonus and motility were reduced and the stomach emptied normally.

The extrinsic nerves of the stomach must operate in a smooth and integrated manner to produce normal gastric function. Yet the fundamental elements of the peristaltic activity of the stomach are not modified by section of the extrinsic nerves. Meschan and Quigley (9) have found that the only effect of vagotomy on the coordinated peristaltic activity of the stomach and pyloric sphincter was a slight decrease in the frequency and intensity of the waves. However, an imbalance between the effects of the two innervations, the splanchnics and vagi, may be an important factor in the etiology of gastric dysfunction. An imbalance may be responsible for the occurrence of ulcers in rabbits after section of the vagi, and in certain dogs after either vagotomy or splanchnicotomy.

The picture of adynamic ileus or acute dilatation of the stomach has never been satisfactorily produced by prolonged splanchnic stimulation or by section of the vagus. Until this is accomplished one will naturally question the importance of the nervous system in the etiology of these conditions. On the other hand, *a priori* evidence would lead one to believe that the extrinsic nerves are involved to some extent.

In regard to the rôle of the pyloric sphincter in regulating gastric evacuation, evidence has been accumulating which demonstrates that it plays a minor rôle, the major factor being the motility of the stomach and antrum (Klein, 10; Thomas, 11). Meschan and Quigley (9) have very recently studied the movements of the pyloric antrum and sphincter and the duodenal bulb in unanesthetized animals by means of a series of balloons. The results show that these three areas operate as one functional unit, waves which originate in the stomach pass successively over all three structures. The pyloric sphincter tends to be relaxed most of the time, contracting only when a peristaltic wave reaches it. This contraction persists while the wave proceeds into the duodenal bulb. The sphincter therefore operates to prevent regurgitation to a much greater extent than to regulate evacuation. Under normal conditions gastric evacuation is regulated primarily by the motility and tone of the stomach and not by a "valve-like" action of the sphincter. However, it should not be forgotten that pathological processes in the region of the sphincter may interfere with normal coordination and in addition

elicit myenteric reflexes which would render the sphincter hypertonic. The important point is that the pyloric sphincter behaves independently of or antagonistically to the stomach only when irritation or other pathology is present.

In regard to the effect of drugs on gastric secretion, Gray (12) has shown that in dogs secreting at a constant rate in response to repeated injections of histamine, atropine produces a definite inhibition of the rate of secretion. However, complete inhibition could not be obtained with tolerable doses of atropine. Occasionally, although the rate of secretion was decreased, the acidity of the juice was increased, which suggests that atropine in these cases inhibited the alkaline mucous secretion to a greater extent than the acid secretion. This observation has been made in human beings and probably accounts for some reports that atropine stimulates secretion when the criterion of the effect has been the acidity of the gastric contents. In dogs atropine can completely abolish the response to a meal in man; it can definitely but incompletely inhibit secretion. When this difference is understood, we may then know why some patients with peptic ulcer manifest a true hypersecretion of gastric juice. Such knowledge, of course, should reveal a rational therapeutic approach.

Gray and Ivy (13) have shown that in dogs acetyl-B-methylcholine (mecholyl) when given in repeated small doses stimulates acid secretion as effectively as histamine. Large doses (1.0 mgm) have a marked inhibitory effect against histamine secretion. Reports on the effect of acetylcholine (the substance thought to be produced by vagal nerve endings) and its derivatives on gastric secretion in human subjects are contradictory. However, those who have obtained inhibition, or a flow of alkaline secretion, have used rather large doses. Perhaps mecholyl in the proper dosage alone or combined with histamine may provide a means of stimulating the flow of pepsin and provide therefore a method of studying the enzyme activity of the stomach in health and disease. The idea that mecholyl stimulates the secretion of gastric mucus in man has not been established. To ascertain this saliva must not be swallowed, and this difficulty has not been avoided by experimenters on human subjects. One would predict on the basis of results on dogs that the proper dose of mecholyl should increase gastric acidity slightly, but not as markedly as in the dog because the gastric secretory mechanism of the dog is more sensitive to atropine than that of man. Mecholyl may possess therapeutic merits because of its possible effect on the

either chloroform or carbon tetrachloride. Four hundred rats were used in these experiments and the results were checked by microscopic examination of the livers. Choline and the anti-pernicious anemia factor of the liver were found to be ineffective under the same conditions. Calcium has been reported to counteract the toxicity of chloroform and carbon tetrachloride without, however, preventing histological changes in the

liver (Lamson, Minot, and Robbins, 43). Recently Neale (44) has reported that the active constituent of the liver extract is sodium xanthine, a purine compound. Injection of this compound was very effective in protecting rat livers. Although it is not clear that sodium xanthine is as effective in curing as in preventing hepatic degeneration, the substance may prove to be of future clinical importance.

PANCREAS

There is recent evidence which indicates that the digestive deficiency in pancreatic achylia may be corrected by the oral administration of a sufficient quantity of potent pancreatic enzymes. Beazell, Schmidt, and Ivy (45) produced a complete pancreatic achylia in the dog by separating the pancreas from the duodenum. When the animals were placed on a diet containing 62 per cent starch, the feces contained 18 to 39 per cent starch.

The administration of diastatic enzymes (taka-diastase, malt amylase, or pancreatin) in relatively large amounts reduced the loss of starch in the feces by 50 per cent. Due to its partial inactivation by acid gastric juice, pancreatin was most effective when given in enteric coated tablets.

Schmidt, Beazell, Crittenden, and Ivy (46) have extended this work to include a study of the effect of oral enzymes on fat and nitrogen digestion in canine pancreatic achylia. Enteric coated pancreatin in sufficient dosage was found to decrease nitrogen loss in the feces by 60 per cent, fat loss by 59 per cent. In addition fecal bulk was reduced approximately 40 per cent, and the stools were better formed. It seems probable from this work that pancreatic achylia in man may also be corrected by administration of the proper amount of pancreatic enzyme. Larger amounts, however, are required than has been customary in the past. It would be of interest to know whether the substance inactivated by autoclaving the pancreas, in the studies of Chaikoff and Kaplan, is the enzymic fraction of raw pancreas.

MINERAL NUTRITION

Appendix. In 1935 Robertson and Doyle (47) reported that young rats fed a diet adequate except for minerals developed a marked intestinal stasis. Elimination of ingested carmine was greatly delayed, and autopsy revealed that the colon and cecum were dilated and filled with excessive amounts of fecal material. Additional Vitamin B complex was without effect, but the simultaneous addition of calcium carbonate and potassium carbonate relieved the condition.

Robertson (48) later conducted similar experiments on 19 children, who received diets deficient in calcium and potassium. These subjects became constipated, and x-ray examination revealed that following a barium meal 33 per cent of the children retained barium in their appendices for from four to twenty-one days, whereas these same children on an adequate diet retained the barium for no longer than one day. She suggests that calcium deficiency should predispose to formation of fecaliths and to the development of infection in the appendix.

Robertson (49, 50) has recently studied this phenomenon in more detail in young rats. The

results indicate that calcium deficiency alone is almost entirely responsible for the appearance of stasis and constipation. This condition is accompanied by an increase in the acidity of the accumulated material in the cecum and colon. Bacterial counts and dilution tests revealed the presence of twice as many micro-organisms per unit weight in the contents of the colon and cecum of the deficient animals as in controls. The increase in acidity is probably an effect of the excess bacteria whose growth is favored by the stasis.

Bone. Bussabarger, Freeman, and Ivy (51) report that when the stomach is removed from growing puppies, the bones do not ossify to a normal extent when the puppies are maintained on a diet adequate for normal puppies. Homogeneous osteoporosis is so severe that bony deformities and even spontaneous fractures result. The osteoporosis is analogous to that observed clinically in severe cases of "celiac disease" without rickets. The deficient ossification is apparently due to a combination of at least three factors: the absence of hydrochloric acid which normally renders the less soluble calcium salts more

creas is choline. Best and his co-workers (27) have shown that choline is also effective in preventing the development of fatty livers in rats fed a high fat or cholesterol diet. Channon, Platt, and Smith (28) have discovered that certain analogues of choline also possess activity, homocholine being even more active than choline. The pathology of choline deficiency in rats has recently been studied by MacLean, Rideout and Best (29). They conclude that choline favors a normal distribution of fat between the liver and body depots, and also prevents a failure of certain functions of the liver as revealed by glycogen storage and bromsulphalein excretion.

The mode of action of choline is unknown. Since it is a constituent of lecithin, it has been presumed to be incorporated in the lecithin molecule and function as the latter in the utilization and transport of fat. In order to test this hypothesis Channon, Platt, Loach, and Smith (30) administered to rats on a high fat diet an active choline analogue, which can be distinguished chemically from choline. None of the compound could be found in the liver phosphatids of these animals. The mode of action of choline is still an open question. It is of interest, however, that fatty infiltration of the liver is a reversible process.

Chaikoff and Kaplan have studied the distribution of the various lipid fractions of the blood and liver in depancreatized dogs with and without raw pancreas or choline in the diet. They report that in the absence of raw pancreas or choline all the lipid fractions decrease in the blood, the most marked changes being in the cholesterol ester fraction (31). These changes are reversed in the liver, in which the lipids are increased with marked deposition of cholesterol esters (32). Feeding raw pancreas can prevent or rapidly restore the blood changes but several weeks are required for the liver to be deprived of all excess fat (33). Choline is equally effective, except that in contrast to raw pancreas it never raises the blood cholesterol esters above normal. This difference in the action of choline and raw pancreas is absent if the pancreas is autoclaved (34). Chaikoff and Kaplan conclude that there are two active fractions in pancreas, one which is heat stable and resembles choline in its effect and a second which is heat labile and acts mainly on the blood lipids.

Dragstedt, Van Prohaska and Harms (35) have presented evidence indicating that the beneficial effects of raw pancreas cannot be accounted for solely on the basis of its choline content. They obtained the additional factor in alcoholic extracts of the pancreas. These extracts

were found to be very potent in preventing fatty degeneration in depancreatized dogs. To the active principle, they gave the name "lipocac." A lively discussion is now in progress regarding this work. Regardless of whether lipocac is a true hormone or is really different from choline, extracts of the pancreas made by Dragstedt's method are active. This has been confirmed in rats by McKay (36).

Recent work suggests that lipocac or choline may have a wide application. Rabbits on a high cholesterol diet develop atherosclerosis as a result of lipid deposition in the arteries. Huber Brown and Casey (37) report that lipocac by mouth effectively prevents this pathological deposition. Grayzel and Radwin (38) have added lipocac to the treatment of 3 cases of hepatomegaly in juvenile diabetics. Previous treatment with careful diet and insulin had failed to reduce the size of the liver. The regular administration of lipocac by capsule to these subjects reduced the liver to normal size in from three to five months. The total blood lipids also decreased. Withdrawal of the extract resulted in enlargement of the liver in one or two months. It is interesting that these authors observed the refractory hepatomegaly in juvenile diabetics. This may be due to the greater severity of diabetes in children and may also be partially explained on the basis of McKay's observation (36) that young rats deposit more fat in their livers than adults when fed a high fat diet and the young animals develop a higher blood fat level on fasting (Rony, Mortimer and Ivy 39).

There is another possible application for lipocac or choline in human disease. It has been reported that progressive liver insufficiency is associated with a progressive fall in the blood cholesterol esters. In fact the direction of change in the blood constituents is apparently an excellent basis for prognosis in this condition (Epstein and Greenspan 40). The cholesterol esters have been reported to fall rapidly after hepatectomy in the dog (Franko and Malczynski 41). Since choline is able to restore the blood cholesterol esters to normal in depancreatized dogs suffering liver damage it may also be effective in arresting or preventing progressive liver insufficiency in human cases.

A still more effective agent in protecting the liver from necrosis and degeneration has been reported by Forbes Neale and Scherer (42). They found that an extract of liver is capable of almost completely protecting the livers of rats from the marked necrosis and degeneration produced by the injection or prolonged inhalation of

midthoracic region, combined with section of a sufficient number of white rami below the level of the trunk section.

Adson (61) reports good results from division of the splanchnic nerves in one case in which three operations had been performed for biliary disease, but in which no stones or active chole-

cystitis had been found. He believes that, if diagnostic procaine block anesthesia of the splanchnic nerves results in the sudden cessation of pain, one is justified in dividing these nerves from abdominal viscera after failure of usual abdominal operations. Some method to prevent regeneration of the severed nerves should be utilized.

DIABETES INSIPIDUS

Fisher, Ingram, and Ranson (62) have very recently published an excellent monograph on diabetes insipidus, in which they review in detail their own work and that of others in this field. Various investigators have produced diabetes insipidus by means of lesions located in the posterior lobe of the hypophysis, the infundibular stalk, or in the hypothalamus. The exact interrelationship of these various regions in the control of water balance has remained obscure because of technical difficulties in localizing lesions in such minute, inaccessible, and contiguous structures. In 1935, Fisher, Ingram, and Ranson (63) applied to a study of this problem the Horsely-Clark stereotaxic instrument by means of which they were able to place discrete lesions in various parts of the hypothalamic and hypophyseal region without disturbance to adjacent structures. They demonstrated that following properly placed bilateral lesions in the hypothalamus, diabetes insipidus uniformly developed. Immediately after operation a transient polyuria appeared, which persisted usually from three to eight days. The cause of this transient phase is still unknown. This was followed by an interphase lasting from two to eleven days during which water exchange returned practically to normal. This was in turn succeeded by the permanent phase of polyuria, during which three to ten times the normal quantity of urine was consistently voided. Similar results were obtained in monkeys, as reported by Ingram, Fisher, and Ranson (64). That the polyuria is primary to the polydipsia was demonstrated by Richter (65), Richter and Eckert (66), and Fisher, Magoun, and Heterington (67).

Fisher and his co-workers (63, 68, 69) have reported on the histological changes in the animals with diabetes insipidus. The characteristic finding was a degeneration of the supra-opticohypophyseal tract, the degree of polyuria being directly related to the degree of involvement of this tract and to no other changes. This was accompanied by degeneration of the supra-optic nucleus, which was recently confirmed by Rasmussen (70), and degeneration in the pars ner-

vosa with disappearance of pituicytes, recently confirmed by Gersh (71).

Since attempts to produce the polyuria by surgical removal of the posterior lobe has not met with uniform success, Ingram and Fisher (72) studied this problem also in cats. They found that in order to produce diabetes insipidus all the tissue histologically resembling the posterior lobe must be removed, including that found along the infundibular stem. Failure to do this probably accounts for the lack of success of earlier investigators. This work led to a revision of the description of the anatomy of the neural division of the hypophysis, as discussed by Ranson, Fisher, and Ingram (69). They maintain that the neural division consists of three parts, (a) the true pars nervosa, (b) the infundibular stem, and (c) the medial eminence, which forms at one and the same time the base of the stem and the floor of the third ventricle. These three parts represent one functional unit, since the histological structure is identical throughout and is easily distinguishable from the adjacent hypothalamus, furthermore, interruption of the supra-opticohypophyseal tract produces exactly the same histological degenerative changes throughout the system. Working independently and from widely different approaches, Tilney (73) and Wislocki and King (74) have reached the same conclusion, that the stem and medial eminence (so-named by Tilney) constitute a functional unit together with the pars nervosa. Diabetes insipidus will develop only when all or nearly all of this tissue is removed or denervated.

Experimental diabetes insipidus can be controlled by extracts of the posterior division of the pituitary gland which contain the anti-diuretic principle (63). Fisher (75) and Fisher and Ingram (76) have shown that although the pituitary glands of diabetic cats contain histologically normal intermediary lobes and a normal content of intermedin (melanophore-expanding principle), the neural division shows marked histological degeneration and possesses neither anti-diuretic, pressor, nor oxytocic substances. They conclude, therefore, that in diabetes insipidus

soluble and assists in the maintenance of an acid reaction in the intestine the absence of the reservoir function of the stomach which results in an increase in the rate of intestinal transport the presence of a postprandial acidosis which is unfavorable for calcium retention Decalcification of the bone also occurs when the adult animal is gastrectomized but deformities and fractures do not result

Blood Hart Steenbock Waddell, and Elve hjem (52) in 1918 reported that rats maintained on an exclusive whole milk diet developed a severe anemia which required copper as well as iron for its correction Several years later Elve hjem and Sherman (53) showed that the copper had no effect on the assimilation of iron but functioned in the conversion of inorganic iron into hemoglobin Since this time it has been generally accepted that copper is an essential element of nutrition Recently, however Beynon (54) has reopened the question of the mode of action of copper She rendered rats anemic by feeding them milk Some were given the iron alone, some iron and copper and others iron and tartrate The animals receiving only iron failed to gain weight, lost their appetites, and became very constipated The other groups did not develop

these symptoms, but continued to grow and regenerate hemoglobin The early administration of mineral oil or tartrate to relieve the constipation in the first group permitted the animals to grow and regenerate hemoglobin as effectively as those receiving copper She concluded from these experiments that copper acted by relieving constipation so that the animals could assimilate enough fats, carbohydrates, and protein to permit growth and hemoglobin formation

It was not suggested how the small amount of copper added to the diet might act to relieve constipation Neither was evidence presented to show that constipation *per se* reduced the assimilation of fat carbohydrates and protein In the light of the recent work of Rhodes (55), it would be of interest to know the effect of copper on the production of indol in the alimentary tract of the rat Rhodes (55) found that in dogs fed diets of milk exclusively the administration of indol caused an anemia to appear Also dogs fed a diet which produced black tongue (canine pellagra) developed an anemia when indol was given to them The same quantity of indol fed to dogs on a normal diet did not cause a significant anemia The administration of liver prevented this type of anemia

SURGERY OF THE SYMPATHETIC SYSTEM

Telford (56) and Smithwick (57) have described operative procedures for sympathetic denervation of the upper extremity in which the first thoracic and inferior cervical sympathetic ganglia are left intact Kuntz Alexander and Furcola (58) point out the inadequacy of this procedure They studied the distribution of fibers from the first thoracic and inferior cervical ganglia in cats by degeneration experiments and in cats and dogs by observations on sweating from the paws following electrical stimulation Their results show that these ganglia contribute fibers to the brachial plexus which are distributed to the forelimb Since there is a close correspondence in the distribution of preganglionic components of the thoracic nerves in Carnivora and man no surgical procedure which leaves the first thoracic and inferior cervical ganglia intact can be expected to accomplish a complete sympathetic denervation of the upper extremity according to Kuntz

Ashkenaz (59) has employed the visceropannicular reflex in the cat as an objective criterion of pain in order to follow sympathetic pain pathways from the artificially distended gall bladder This reflex consists of a contraction of the pan-

niculus carnosus muscle following adequate painful stimulation By this technique he has found that centripetal fibers from the viscera enter the cord through a number of posterior roots If an insufficient number of roots are sectioned the remaining ones assume the entire burden of conduction without impairing the reflex Further more the fibers may ascend some distance in the sympathetic trunk before entering the cord or they may enter the cord directly and ascend entirely within it The entire centripetal pathway is intercepted by sectioning the splanchnic nerves which confirms older observations (Shrager and Ivy 60) Although vagus fibers to the gall bladder have been described they are not involved in pain conduction Ashkenaz points out that these findings account for the failure of many surgical attempts to relieve visceral pain Dorsal rhizotomy has never included a sufficient number of roots section of the ventrolateral spinothalamic tracts may have failed because of ascending paths in the sympathetic trunk Of several possibilities Ashkenaz recommends the following as a surgical procedure to be used in eliminating visceral pain pathways section of the sympathetic trunk in the

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there is a deficiency of the secretion of the anti diuretic principle and that the elaboration of this component, as well as of the pressor and oxytocic components, is under control of the supra-optico-hypophyseal tract

Although the evidence is conclusive that the neural division of the hypophysis is the site of elaboration of these hormones, no definite glandular cells had been identified in this structure. The only specialized cell present is the pituicyte, which has been considered a special type of glial cell. However, Gersh (71) has recently presented histological evidence which indicates that the pituicytes are really glandular elements. He has supported this conclusion by physiological evidence as well. When the water intake of rats was restricted, the number and size of the glandular cells increased upon restoring a normal water intake their number and size reverted to normal. This correlates well with the findings of Gilman and Goodman (77), that if rats are deprived of water, a condition which would demand careful water conservation the anti diuretic hormone can be found in the urine. If the water intake is normal the hormone could not be detected in the urine. Gersh finds that these glandular elements are supplied by nerve fibers which descend in the infundibular stem. Section of these nerves results in degeneration of the glandular cells accompanied by polyuria. The evidence therefore appears complete that removal or degeneration of the glandular elements of the neural division of the hypophysis produces a deficiency in anti diuretic hormone which manifests itself as diabetes insipidus.

However, this is not the whole story. It is well known that complete hypophysectomy does not produce diabetes insipidus. Accordingly in addition to the deficiency factor there must also be a positive factor, presumably resident in the anterior lobe, which is involved in the genesis of this disease. Limiting ourselves to recent literature on this aspect of the question Dodds Noble and Williams (78) and Keller (79) were able to abolish an experimental diabetes insipidus by removing the anterior lobe of the pituitary gland. In regard to the mechanism by which the anterior lobe accomplishes its diuretic effect, it is natural to suspect the thyroid-pituitary relationship. Keller (79) administered a pituitary extract containing the thyrotropic hormone (see previous review) to dogs in which the polyuria had been abolished by removal of the anterior lobe. Polyuria was restored temporarily by this procedure. The temporary nature of the effect he attributed to the well known anti thyrotropic effect. He

concluded that the anterior lobe maintains polyuria by virtue of its thyrotropic effect. Fisher and Ingram (80), on the other hand, found in polyuric cats that thyroidectomy reduced the polyuria by only 50 per cent which indicated that the thyrotropic mechanism could be only partly responsible for the diuretic effect. That this is true also for man was shown by Findley and Hembeker (81) who performed a total thyroidectomy in a clinical case of diabetes insipidus. Postoperatively the polyuria was reduced no further than could be accomplished preoperatively by restricting the intake of sodium chloride. It remains to the future to clarify the mode of action of the anterior lobe of the hypophysis in the genesis of diabetes insipidus.

From the results of animal experiments patients should manifest permanent diabetes insipidus only when the entire posterior lobe or the supra-optic portion of the hypothalamus is degenerated and some anterior lobe tissue is present. They should also manifest a permanent although milder polyuria when the stalk is severed so as to obtain degeneration of the posterior lobe. However, it is known that in some patients, diabetes insipidus may clear up spontaneously or after several injections of pituitrin, which indicates only a temporary suppression of secretion of the anti diuretic principle. In a long standing case of diabetes insipidus a decrease in polyuria might indicate a degeneration of the anterior lobe and prognosticate the development of Simmonds disease.

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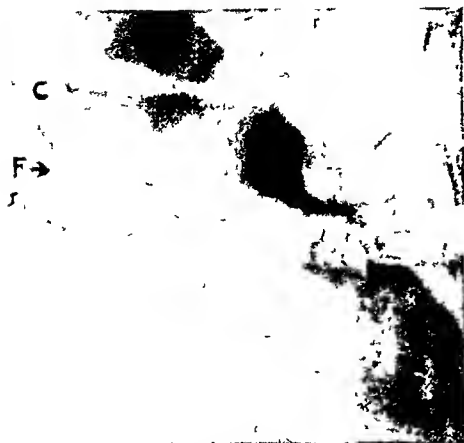


Fig 1 Collum fracture, bilateral, with fracture at symphysis of mandible, the x-ray shows a fracture of the condyle on the left, with forward displacement of neck and overriding due to muscular contraction

such as swelling of the face, fractures of the body of the mandible or base of the skull, and secondary infection of adjacent parts. In infants mandibular ankylosis often is overlooked during the period of nursing from the breast or the bottle, and may not be discovered until much later when solid food is given.

When ankylosis is complete there is generally little difficulty in establishing a diagnosis as the patient's chief complaint is a long-standing history of

inability to open the mouth. Fracture of the condyle of recent origin, which often prevents free motion, can be ruled out easily enough. Muscular trismus, however, sometimes produces complete locking of the jaw or pseudo-ankylosis, and when it becomes chronic, as in cases of actinomycosis and myositis ossificans, may be mistaken for ankylosis vera. The more common acute type of trismus of the masseter and internal pterygoid muscles is more easily differentiated, because it is as a rule of very recent development, and is due to infection, particularly pericoronal infection around a partly erupted third molar. It is also attended by pain, swelling at the angle of the jaw, painful deglutition, and a rise in temperature. X-ray examination discloses the condition. For the purpose of differential diagnosis it should also be remembered that the head of the condyle may be the seat of osteoma or chondroma.

Roentgen examination often gives valuable information, although the result may be disappointing on account of anatomical conditions. In cases in which hyperostosis is excessive and ankylosis with the base of the skull or zygoma is involved, good roentgen demonstration of the deformity is especially difficult. It is nearly always necessary to take exposures from various angles, and the anteroposterior as well as lateral positions are needed. Sometimes stereoscopic pictures are of value.

The treatment of ankylosis is surgical. Division of the fibrous connections in the joint is seldom successful, partly on account of the great depth of the condyle, which makes access difficult, and partly because this severance would hardly give permanent relief. Osteotomy at the neck of the condyle with arthroplasty often prevents reattachment, but only



Fig 2 Collum fracture with median displacement C=condyle, F=fracture



Fig 3 Collum fracture with lateral displacement C=condyle

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Thoma K. H. Traumatic Injury of the Condylar Process of the Mandible (*New England J. M.*, 1935 218 63)

Traumatic injury of the condylar process is not easily diagnosed and is often difficult to treat. The injuries may be classified as follows:

- I Subluxation (unilateral or bilateral)
- II Dislocation without fracture (unilateral or bilateral)
 - 1 Forward
 - 2 Backward
 - 3 Upward
- III Collum fracture (unilateral or bilateral)
 - A Overriding of fragments
 - B Displacement of condylar process
 - 1 Forward
 - 2 Medial
 - 3 Lateral
 - C Dislocation of the condylar process
 - 1 Medial
 - 2 Lateral
- IV Traumatic ankylosis (unilateral or bilateral)

Subluxation often the result of minor trauma causes weakness of the joint. In some cases the condyle catches every time the jaw is opened wide and recedes with a jumping motion. In other cases the meniscus because of rupture of the attachment to the external pterygoid muscle remains stationary, the condyle slides off it, and the anterior margin makes an annoying sound when striking the articular eminence. Treatment is limitation of motion by a dental appliance or intermaxillary ligation to gain complete rest for from three to six weeks.

Dislocation without fracture is more often bilateral than unilateral. Forward dislocation is the most frequent type. The condyle is locked anteriorly to the articular eminence by muscle tension. The incisor teeth show an open bite and the condyles stick out prominently in front of the tragus of the ear. Careful manipulation often under general anesthesia will reduce the dislocation and in order to prevent recurrence and chronic dislocation rest of the joint as directed for subluxation is required.

Backward dislocation is due either to detachment and forward displacement of the meniscus so that the head of the condyle can move further up into the articular fossa or to forceful crushing of the condyle through the bone into the auditory canal which is recognized by hemorrhage from the ear. Treatment consists of careful manipulation under ether and several weeks of rest with the occlusal surface of the teeth held apart by a rubber wedge to

prevent the muscles from pulling the condyle into the fossa. Ankylosis may result in spite of this.

Upward dislocation may occur in connection with backward dislocation (displacement of meniscus) or it may result when the head of the condyle is forced through the glenoid fossa into the middle cerebral fossa. Treatment is the same as for backward dislocation except that external drainage may be indicated. Ankylosis may result.

Collum fracture or fracture at the neck of the condyle occurs frequently and in multiple fractures is often overlooked. The roentgenogram should cover the area of the joint in all cases of facial injury. The fracture may be unilateral or bilateral. If not treated shortening of the ramus due to overriding of the fragments may cause malocclusion.

Displacement of the condylar process is common. Forward, medial and lateral displacements occur. Reduction may be accomplished by manipulation under avertin or ether anesthesia and immobilization of the mandible by ligation to the upper jaw. Often open reduction is indicated through an incision parallel to the zygomatic arch.

Dislocation of the condyle may be associated with the fracture. Median dislocation is the common type because of anatomical conditions. Continued force after the fracture has occurred pushes the medially bent condyle through the capsule out of the socket. Lateral dislocation is rare because of the very strong outer ligament. Reduction of the dislocated and fractured condyle is of great importance and generally open reduction must be resorted to. This is followed by intermaxillary ligation. Unless infection sets in ankylosis is rare in the early cases.

Ankylosis of the jaw may follow traumatic injury although it is more frequently caused by infectious arthritis, otitis media and osteomyelitis of the ramus. Orlow (*Deutsche Zeitschrift für Chirurgie* 1903 66 399) who wrote one of the most comprehensive articles on mandibular ankylosis found trauma as the cause in 28 of 100 cases. In 23 of these cases the trauma was due to accidents such as a fall on the chin, a blow or a fracture of the body of the jaw or base of the skull. In a few cases there was a compound fracture due to gunshot injury and in 2 cases forceps delivery was the cause. We therefore find ankylosis resulting from a variety of traumatic injuries. The immediate causes however are interarticular hemorrhage, comminution of the joint and secondary infection. A case of fracture of the base of the skull complicated by otitis media and mastoiditis is reported.

The onset of ankylosis is not always promptly recognized because its development is gradual and is often overshadowed by more noticeable symptoms.

MOUTH



Fig 3 Stenosis at lower portion of sac in the first two radiographs, while in the third the stenosis is in the middle third of the duct

To facilitate accurate angulation the dental pointer cone is invaluable. The central ray should pass slightly anterior to the dense superior lateral portion of the superior orbital margin near the zygomaticofrontal suture, medially and caudally, at an angle of 25 degrees to the lower end of the lacrimal fossa. An exposure of 2 seconds, using 60 kv and 25 ma at a target-film distance of 18 in is approximately correct.

To investigate the condition of the duct distal to the stricture a curved tube was made, with clasps to slip over an antroscope, to allow the introduction of a No. 4 silk wound catheter by direct vision into the nasal ostium of the lacrimal duct. In favorable cases the lacrimal duct may also be probed through the director.

EDWARD S. PLATT, M.D.

EAR

Rosenberger, H. C.. Solitary Xanthoma of the External Auditory Canal. *Arch Otolaryngol*, 1937, 26 395

The author has reported in considerable detail on a case of solitary xanthoma of the external auditory canal.

Xanthomatous lesions are of special interest to the dermatologist because of their frequent appearance on the surface of the body as xanthomatous papules, tubercles, nodules, tumors, infiltrated plaques, striæ, or non-elevated, smooth, plane areas. They are of special interest to the ophthalmologist because they are on the conjunctiva and the cornea. The general surgeon and the pathologist deal with xanthomatous lesions in the tendons, lungs, spleen, skull, and brain, while the otolaryngologist encounters them in the mouth, esophagus, trachea, and bronchi. In this connection, the author has been unable to find in the literature an instance of the occurrence of xanthomatous tumor of the external auditory canal.

JAMES C. BRISWELL, M.D.

Kennedy, R. H.: Epithelioma of the Lower Lip. *Ann Surg*, 1937, 106 577

In epithelioma of the lower lip, conservative treatment demands the removal of the lymph drainage area whether or not metastatic involvement of the lymph nodes is evident. When lymph nodes were not palpable before operation, metastases were never found except in the submental or submaxillary nodes. Whenever involved nodes were found in other regions, clinical evidences of metastases were invariably definite before operation. In some patients in whom no dissections of the neck were made, metastases developed during the period of observation, but only in the submental or submaxillary regions first. When there is no clinical evidence of metastases, the author believes that block excision of the submental and submaxillary nodes is sufficient. The mortality of this operation is low, the morbidity brief, and the scar not unsightly. In a series of 339 patients, it was found that the majority of deaths occurred when a more extensive procedure was undertaken, e.g., a bilateral block dissection at one operation, an extensive plastic procedure on the lip, or a partial resection of the jaw. There were 163 patients who had block dissections to the omohyoid crossing, with no more extensive procedure on the lip at the same operation than a V excision. There were 9 deaths. This represents the mortality in block dissections of the neck (5.5 per cent). Since bilateral block dissections were effected on many patients in two operations, these 163 patients had 214 block dissections. Therefore, one might consider the mortality of this operation as 4.2 per cent.

If involvement of the submental or submaxillary nodes is present, no arrest of the disease can be expected from this limited operation. More extensive excision must be undertaken. A detailed description of the suprahyoid operation is presented.

The following routine for the treatment of epithelioma of the lower lip is suggested.

In all local lesions a biopsy or excision should be made. Grade 1 lesions not more than 1 cm in diameter without deep ulceration, without infiltration apparently extending to muscle, without palpable nodes in the neck, and of comparatively brief duration, may be treated locally only on the responsibility of the surgeon, but the lesion must fulfill all these requirements. The local lesion may be treated either by surgery or irradiation. If nodes are not palpable or if the surgeon does not believe palpable nodes contain metastases, a block dissection of the submental and of one or both submaxillary regions should be effected at one operation. Only one side may be dissected in case the lip lesion is in the lateral third only. If metastases are found in this dissection, a further block dissection should be performed to the omohyoid crossing on the side involved. If palpable nodes are present, and are believed to contain cancer, the patient should undergo a block dissection of the nodes of the neck to the omohyoid crossing. If the

temporarily. The most satisfactory result is gained from osteo arthrotomy.

In performing an osteo arthrotomy a horizontal incision made over the zygomatic process and extended at right angles in front of the ear down to the tragus gives the desired exposure. The condyloid process is sectioned first generally at its attachment to the ramus, at about the height of the mandibular notch. The condyle is then excised. If there is considerable hyperostosis the chisel has to be used to separate the bone from the base of the skull or from the zygomatic arch. If the coronoid process is involved the osteotomy must be performed in the upper part of the ramus, with separation and excision of both the condyloid and coronoid processes.

Eight case histories illustrate various forms of traumatic injury are reported.

EYE

Hourn G. E. X-Ray Visualization of the Naso-lacrimal Duct. *Ann. Otol. Rhinol. & Laryngol.* 1937 46 963

The use of radiopaque material in the x ray study of the lacrimal duct was originated in 1909 by Ewing. Hourn has supplemented the usual antero-posterior and lateral plates by using a modified dental film within the nose which eliminates confusing bone shadows. In a study of treatment or perspective operation in disorders of the efferent lacrimal system it is of definite value to know the exact point of stricture. In the Mosher-Tott operation the anterior ethmoid cells may be visualized by the Proetz displacement method with lipiodol and an intranasal film. Campbell suggests the use of a bismuth stripe over the ventral extremity of the middle turbinate to determine the overhang of this turbinate in relation to the lacrimal fossa.

The anatomical details of the lacrimal sac and canal are discussed. Schaeffer has demonstrated many variants from the so-called typical naso-lacrimal duct. He states that at least two important types of nasolacrimal ducts are encountered. One



Fig. 2. Note normal duct on the left. On the right no lipiodol entered the sac. Constriction apparently at the common duct. Eight to ten minutes after injection the left duct partially emptied as shown in anteroposterior view.

type is quite regular in contour and is in direct line with the lacrimal sac with which it gradually merges. The other main type is very irregular somewhat tortuous and not infrequently connected with the lacrimal sac in a side to side union. Both types may have diverticula but they are more frequently found in ducts with irregular walls. The so-called valves which have been described at the junction of the sac and the duct at the nasal ostium, or between the two locations are probably mucosal folds resulting from embryological remnants.

The intranasal film as a substitute for the lateral view is used in adults who do not present the technical difficulties encountered in children or in adults in whom there is mechanical interference in the proper placement of the film.

The Eastman dental film cut down as illustrated is satisfactory. After shrinking and cocainization the average adult nose will accommodate the film. The plane of the film can be altered or if there is an insurmountable obstruction the other nasal chamber can be utilized. The anterior border of the film should extend at least 5 mm. anterior to the ventral extremity of the middle turbinate. The base of the film should be over the second bicuspid to the second molar teeth.

After expressing the contents of the lacrimal sac a No. 24 needle is introduced via the cocaineized punctum. The small needle is used because of the ease with which it can be introduced in spite of the fact that it offers a good deal of resistance to the lipiodol. Lipiodol diluted with equal parts of olive oil is used for the pathological cases and the unaltered lipiodol for the normal duct or those which empty promptly. It is especially important in the latter group that the duct be injected in the x ray room and that preparation be made for prompt exposure.



Fig. 1. II nasal film made from dental film as in I. Film placed in nasal cavity as in III.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS, CRANIAL NERVES

Dandy, W. E.: Intracranial Pressure Without Brain Tumor. *Ann Surg*, 1937, 106 492.

The author reports in detail the histories of 22 cases in which the signs and symptoms of increased intracranial pressure were present without an intracranial tumor or a space-occupying lesion of any kind. A clinical diagnosis of unlocalized brain tumor was usually made, but was excluded by ventriculography. The ages of the patients varied from nine and one-half to forty-eight years. Headache was the chief symptom in the majority of the cases, but the common signs of increased intracranial pressure were usually present. In 13 of the 22 cases the symptoms had been present for less than one year before the patient applied for treatment. Papilledema was the outstanding objective finding in every case. The intracranial pressure of the spinal fluid varied from 250 to 550 mm of water. With 2 exceptions, the cell count and globulin of the spinal fluid were within normal limits. In only 1 case was the Wassermann reaction positive in the blood and cerebrospinal fluid. In every instance, by ventriculography, the ventricles were found to be small, usually markedly undersized and symmetrical.

The author recommends a right subtemporal decompression if the symptoms and objective findings indicate its need. Subtemporal decompression is necessary in most, but not all, cases because the intracranial pressure frequently persists for months and even years. In every case in which subtemporal decompression was done the author reported a complete spontaneous cure. He calls attention to the very rapid increase and decrease of intracranial pressure, varying from one extreme to the other, all within two or three minutes. This extreme variation in intracranial pressure, he believes, can only be explained by variation in the intracranial vascular bed, probably through vasomotor control. Since fluid is never in the subdural space, the only other place where it could be formed to excess and cause intracranial pressure, without increasing the size of the ventricles, would be in the substance of the brain.

ROBERT ZOLLINGER, M D

Villaret, M., Cachera, R., and Fauvert, R.: Vascular Reactions in the Brain to Solid and Gaseous Emboli (Les réactions vasculaires du cerveau au cours des embolies solides et gazeuses). *Presse méd*, Par, 1937, 45 1555.

Villaret and his associates report an experimental study of the effect of solid and gaseous emboli on the cerebral blood supply. They used the technique of Forbes and Wolff for direct microscopic examination of the blood vessels of the cerebral cortex, employing dogs under chloral anesthesia as the experi-

mental animals. They also made photomicrographs every five seconds, and by so doing they had a graphic record of their findings which could be studied in detail.

For producing solid emboli they employed pulverized pumice stone in suspension, the particles had a diameter of approximately 150μ . As these particles were sharp, they undoubtedly caused more irritation of the vascular endothelium than smooth particles. The pumice stone suspension was injected into the common carotid on the same side as the trephine opening. Two types of reaction to this injection were noted.

1. A vasoconstriction of all the arterioles of the pia mater, which caused an ischemia and pallor of the surface of the brain. This constriction was noted at a distance from the site where the embolus was arrested.

2. There were arteriolar spasms manifested by the spasmodic formation of notches in the walls of the arterioles. This phenomenon occurred just at the site of a bifurcation of an arteriole in the larger branch of the two. These spasms reduced the caliber of the larger branch and tended to direct the blood stream toward the smaller branch. They occurred at various distances from the site where the embolus was arrested.

To produce gaseous emboli, air was introduced at various points in the carotid or in the pulmonary vein. In some cases very small air bubbles could be seen in the blood stream of the cerebral cortex without any interference with the circulation. In other cases a large air embolus temporarily blocked the circulation, leaving the arteriole above it empty of blood. But after a few minutes the circulation was reestablished by a rhythmic movement of the column of blood. No air bubbles were ever demonstrated in the veins, although it is evident that the air must have left the circulation by this route after passing through the capillaries. It is probable that this passage through the capillaries caused so great a dispersion of the air embolus that the resulting air bubbles were too small to be demonstrated in the veins of the pia mater. An injection of adrenalin, which increased the blood pressure, facilitated the reestablishment of the circulation in the cerebral vessels, while any drug that caused hypotension, such as amyl nitrate, inhibited the reestablishment of circulation and prolonged the period of obstruction by the air embolus.

The authors note that their experiments show that while solid emboli cause arteriolar vasoconstriction and spasm in the brain, gaseous emboli produce no such reactions in the arteriolar walls, however, gaseous emboli may produce a temporary ischemia in the area supplied by the arteriole in which a mechanical obstruction by the embolus occurs.

ALICE M. MEYERS.

lesion is in the middle third of the lip this dissection should be bilateral and should be undertaken in two operations. If the surgeon considers that the general condition of the patient does not warrant a block dissection to the omohyoid crossing with an operative mortality of possibly 55 per cent as against a cancer mortality of at least 20 per cent he may treat the lesion locally only stating his reason on the chart. If nodes other than submental and submaxillary are found to be involved the remainder of the lymph drainage area down to the clavicle should be excised. Any operative procedure undertaken upon patients with fixed nodes should be considered experimental and palliative only. Otherwise these patients should receive radiation therapy for palliation only if the radiotherapist consents. Follow up observation shall be monthly for the first year every two months for the second year every three months for the third year and then every six months for the duration of life.

JOSEPH K. NARAYAN M.D.

NECK

Clute H. M. and Albright H. L. The Management of Minor Complaints After Thyroidectomy. *New England J. M.* 1937 217 547

The surgical management of toxic goiter is a well standardized procedure. Minor postoperative difficulties are:

1. Difficulty in breathing and swallowing
2. Changes in the voice
3. Injuries to the superior and inferior laryngeal nerves
4. Scars
5. Deformity in the contour of the neck

The best relief for postoperative difficulties in breathing and swallowing is to have the patient sit up following the operation and to bend the neck forward as much as possible when swallowing.

An increased secretion of mucus can be controlled with the potassium present in Lugol's solution by the administration of morphine in quantities sufficient to suppress the cough reflex by inhalation of steam or tincture of benzoin postural drainage and minute doses of atropine.

The sense of a lump pressing on the trachea is sometimes due to edema of the prethyroid tissue, but

more frequently to an actual collection of fluid. The patient should be transported with the head flexed on the chest following the operation. The accumulation of serum follows incomplete hemostasis, the ligation of too large pedicles of tissue, the inclusion of too large pieces of muscle in the mattress suture and the use of too large suture material. The authors use 0000 ties in the skin, 00 ties in the gland and very fine chromic catgut for the prethyroid muscles.

If the hematoma is small one can poultice the wound, but if it is good sized it is best to clean it out and find if possible the oozing vessel close the flap with skin clips and enclose a small rubber drain in one corner. The drain should emerge from an angle of the scar and be removed within from twenty-four to forty-eight hours.

The general edema across the front of the neck is due to too large an incision. For brawny edema immediate probing is done and an ice collar is applied for one hour every other hour.

Postoperative pain across the back of the neck and shoulders is more frequent in older people and is probably due to a hyperextension of the neck during the operation. Codeine and aspirin are more effective than morphine in controlling this pain.

Change in the voice is attributed by Roeder to injury of the superior laryngeal nerves. It can be avoided by accurate opening exposure and clamping of the superior thyroid vessels just outside the thyroid gland and if possible, by clamping of the branches individually and separate ligation.

The impression has been gained that the superior laryngeal nerve is sensory as well as motor (a part of the larynx and a part of the pharynx which is involved in important reflexes).

Special pains should be taken to insure a good scar. If a wrinkle can be found a scar should be made there. Over a large adenoma the incision should be carried slightly upward because the skin will retract downward after its removal. Clips are used to close the skin every other clip is removed after twenty-four hours and all clips are removed after forty-eight hours. Scar deformities can be avoided by preserving the hypoglossal nerve and by filling the suprasternal area with prethyroid muscle. To avoid relapse in the pyramidal lobe it is removed if found at operation.

FRED S. MODERN M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Dandy, W. E.. Intracranial Pressure Without Brain Tumor. *Ann Surg*, 1937, 106 492

The author reports in detail the histories of 22 cases in which the signs and symptoms of increased intracranial pressure were present without an intracranial tumor or a space-occupying lesion of any kind. A clinical diagnosis of unlocalized brain tumor was usually made, but was excluded by ventriculography. The ages of the patients varied from nine and one-half to forty-eight years. Headache was the chief symptom in the majority of the cases, but the common signs of increased intracranial pressure were usually present. In 13 of the 22 cases the symptoms had been present for less than one year before the patient applied for treatment. Papilledema was the outstanding objective finding in every case. The intracranial pressure of the spinal fluid varied from 250 to 550 mm. of water. With 2 exceptions, the cell count and globulin of the spinal fluid were within normal limits. In only 1 case was the Wassermann reaction positive in the blood and cerebrospinal fluid. In every instance, by ventriculography, the ventricles were found to be small, usually markedly undersized and symmetrical.

The author recommends a right subtemporal decompression if the symptoms and objective findings indicate its need. Subtemporal decompression is necessary in most, but not all, cases because the intracranial pressure frequently persists for months and even years. In every case in which subtemporal decompression was done the author reported a complete spontaneous cure. He calls attention to the very rapid increase and decrease of intracranial pressure, varying from one extreme to the other, all within two or three minutes. This extreme variation in intracranial pressure, he believes, can only be explained by variation in the intracranial vascular bed, probably through vasomotor control. Since fluid is never in the subdural space, the only other place where it could be formed to excess and cause intracranial pressure, without increasing the size of the ventricles, would be in the substance of the brain.

ROBERT ZOLLINGER, M.D.

Villaret, M., Cachera, R., and Fauvert, R.: Vascular Reactions in the Brain to Solid and Gaseous Emboli (Les réactions vasculaires du cerveau au cours des embolies solides et gazeuses). *Presse med*, Par., 1937, 45 1555

Villaret and his associates report an experimental study of the effect of solid and gaseous emboli on the cerebral blood supply. They used the technique of L'orbes and Wolff for direct microscopic examination of the blood vessels of the cerebral cortex, employing dogs under chloral anesthesia, as the experi-

mental animals. They also made photomicrographs every five seconds, and by so doing they had a graphic record of their findings which could be studied in detail.

For producing solid emboli they employed pulverized pumice stone in suspension, the particles had a diameter of approximately 150μ . As these particles were sharp, they undoubtedly caused more irritation of the vascular endothelium than smooth particles. The pumice stone suspension was injected into the common carotid on the same side as the trephine opening. Two types of reaction to this injection were noted.

1. A vasoconstriction of all the arterioles of the pia mater, which caused an ischemia and pallor of the surface of the brain. This constriction was noted at a distance from the site where the embolus was arrested.

2. There were arteriolar spasms manifested by the spasmodic formation of notches in the walls of the arterioles. This phenomenon occurred just at the site of a bifurcation of an arteriole in the larger branch of the two. These spasms reduced the caliber of the larger branch and tended to direct the blood stream toward the smaller branch. They occurred at various distances from the site where the embolus was arrested.

To produce gaseous emboli, air was introduced at various points in the carotid or in the pulmonary vein. In some cases very small air bubbles could be seen in the blood stream of the cerebral cortex without any interference with the circulation. In other cases a large air embolus temporarily blocked the circulation, leaving the arteriole above it empty of blood. But after a few minutes the circulation was reestablished by a rhythmic movement of the column of blood. No air bubbles were ever demonstrated in the veins, although it is evident that the air must have left the circulation by this route after passing through the capillaries. It is probable that this passage through the capillaries caused so great a dispersion of the air embolus that the resulting air bubbles were too small to be demonstrated in the veins of the pia mater. An injection of adrenalin, which increased the blood pressure, facilitated the reestablishment of the circulation in the cerebral vessels, while any drug that caused hypotension, such as amyl nitrate, inhibited the reestablishment of circulation and prolonged the period of obstruction by the air embolus.

The authors note that their experiments show that while solid emboli cause arteriolar vasoconstriction and spasm in the brain, gaseous emboli produce no such reactions in the arteriolar walls, however, gaseous emboli may produce a temporary ischemia in the area supplied by the arteriole in which a mechanical obstruction by the embolus occurs.

ALICE M. MEYERS.

Puech P. and Krebs E. Traumatic Intracranial Serous Meningitis and Arachnoiditis (Méninges séreuses et arachnoïdites encéphaliques traumatiques) *J de chir* 1937, 50 749

Puech and Krebs look upon serous meningitis and arachnoiditis as one of the commoner end results of craniocerebral injuries. Classifying these complications as to being early or late, localized or diffuse in the vault or at the base (chiasmal or posterior fossa) the authors emphasize the difficulty of diagnosis offered by such pathology and point out the fact that without operative interference it may be confused in its early state with cerebral edema alone, meningeal hemorrhage, hematoma or the hypotension of the cerebrospinal fluid following a cranial injury. Its late appearance may cause it to be confused with tumors or old subdural hematomas.

In a series of 46 cases of craniocerebral injury on the service of Vincent which were operated upon 20 were observed to present a serous arachnoiditis or meningitis with pockets or large lakes of cerebrospinal fluid trapped in dense arachnoidal membranes and some with cortical scars depending upon the extent of the original injury. All of the 20 patients recovered and were definitely benefited by the operation. Following localization of the lesion either by ventriculography or by clinical signs osteoplastic flaps were turned down, the cystic accumulations of fluid were drained, the thickened arachnoidal membranes were removed, cortical scars were resected and the patients were left with large decompressive craniectomies. Such operative treatment was regarded with great enthusiasm and expectation.

While the authors offer several theories as to the pathogenesis of this lesion of the meninges they obviously believe that the mechanism of its production is poorly understood. They suggest that the lesion may be a secondary cicatricial reaction of the arachnoid following mechanical injury of the arachnoid or the end result of a resorbed hematoma or more vaguely an irritative reaction of the arachnoid on a toxic or directly infectious basis. They stress however the importance in the patient's history of what may seem to be only an insignificant head injury and point out also that a chiasmal arachnoiditis for instance need not always result from trauma to that region but may follow injury in a more remote portion of the head. JOHN MARTIN M.D.

Davis L. and Weil A. The Effect of Radiation Therapy Upon Intracranial Gliomas *Ann Surg* 1937 100 599

In an attempt to learn the true effects of radiation therapy upon intracranial gliomas 3 procedures may be followed:

1. Tumors so treated may be compared with untreated tumors of the same type.

2. A comparison may be made between regions of the tumor which have been treated and areas of tumor tissue which have not been exposed to radiation and which are remote from the primary locus of operation.

3. Biopsy material obtained at the time of operation and preceding radiation may be compared with autopsy material or specimens obtained at a second operation after prolonged treatment.

Of these methods the second is preferable.

In the comparison of a untreated case with 4 cases of glioblastoma which had been operated upon and treated with roentgenotherapy the impression was gained that the treated tumors were much more solid and microscopically they had larger central areas of necrosis with an increase in the stroma, collagenic and argyrophilic fibers to the periphery of the necrotic areas there was found an intense proliferation of tumor cells apparently not inhibited by radiation. In 1 case of medulloblastoma the authors found little evidence of radiation effect whereas in an ependymoma marked inhibition of tumor growth was noted. The authors were unable to note an appreciable difference in the survival periods of the treated and the untreated cases.

The use of radium therapy was tried in 24 cases. Cross fire radiation was employed over two areas of the skull. Each patient received 600 mgm hours per day until a total of 160,000 mgm hours had been received through the two portals. With this therapy the clinical impression was gained that the cases treated by radium progressed more satisfactorily than a similar group treated by roentgenotherapy or left untreated. This impression was not substantiated however when subjected to rigid analysis against the authors' records.

In the discussion of the paper the senior author makes the following cogent remarks, "We must maintain a scientific attitude toward the problem of radiation therapy in intracranial gliomas. We must require the same criteria as are required in a physiological experiment. We must know as accurately as possible how much of the tumor has been removed surgically. We must know accurately the histological character of the tumor before roentgenotherapy. We must know the exact amount of radiation therapy given and we must make an effort to study the brain or any remaining tumor after radiation therapy has been given. Such cases must be compared accurately with cases in which the tumor has a similar cell type but in which no radiation therapy has been given. Only after these exacting conditions have been fulfilled and correlated with the clinical course will we be able to state accurately and definitely the effect of radiation therapy upon gliomas. JOHN WILLIAMS M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Hicken, N. F., Best, R. R., and Hunt, H. B.: Discharges from the Nipple: Their Clinical Significance and Mammographic Interpretation *Arch Surg*, 1937, 35 1079

A spontaneous discharge from the nipple of a non-lactating breast is indicative of a physiological or pathological abnormality, but it furnishes no clue as to the provocative factor

An abnormal discharge from the nipple means that the causative lesion has originated within or has secondarily invaded the ductal and secretory system of the breast. A hemorrhagic, serosanguineous or serous discharge is not pathognomonic of any disease but may be associated with a papilloma, a carcinoma, a sarcoma, or a simple cyst. A serous, a greenish white, a purulent, or a milky discharge may be symptomatic of desquamative epithelial hyperplasia, postlactation involution, "caked breast," retention mastitis, infection of the milk ducts, cysts, or galactoceles

A method of obtaining an accurate roentgenographic pattern of diseased or normal milk ducts has been developed. It consists of cannulating the orifices of the ducts with a blunt No. 26 gauge needle and then distending them with contrast mediums, after which a stereoscopic roentgenogram is made

Any pathological condition which destroys, invades, obstructs, or distorts the ducts can be readily detected

These visualizing mammograms are invaluable in determining the location and extent, and identifying characteristics, of pathological states which produce abnormal discharge from the nipple. Typical mammograms demonstrating a papilloma, a carcinoma, a simple cyst, an infected cyst, retention mastitis, "caked breast," a galactocoele, and postlactation involution are presented

The pre-operative visualization of the breast permits an accurate diagnosis and the employment of the proper remedial measures. By its use the need for biopsy and prophylactic mastectomy will be reduced to a minimum. JOSEPH K. NARAT, M.D.

Soupault, R., and Moulier, S.: The Antitoxin Treatment of Abscess of the Breast (*L'anatovithérapie des abcès du sein*) *Ann. méd.-chir.*, Par., 1937, 2 211

Impressed by the necessity of repeated surgical intervention in the drainage of abscesses of the breast, by the frequent undesirable cosmetic result, and by the prolonged morbidity of the patients, Soupault and Moulier used staphylococcus antitoxin in the treatment of 29 cases of threatened or early breast abscess, with complete recovery in 27



Fig. 1

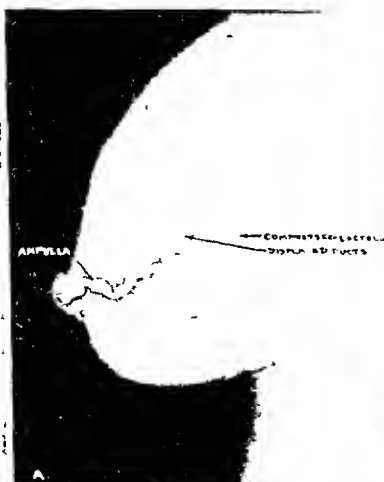


Fig. 2a

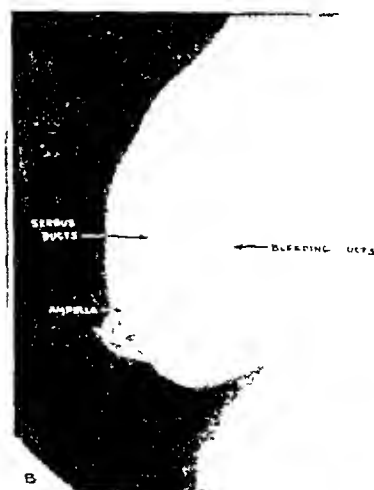


Fig. 2b

Fig. 1 Mammogram in a case of papilloma, showing the bleeding duct visualized by the injection of 2 ccm of colloidal thorium dioxide. The papilloma appears as a "negative shadow" in the ampulla. Figs. 2a and b Mammograms in a case of carcinoma. A shows a bleeding duct into which 2 ccm of colloidal thorium dioxide was injected

The outer segment of the duct is smooth, tortuous and dilated, the inner portion has but few communicating ducts, for they have been destroyed, displaced, and compressed by the malignant tumor. B shows a duct emitting a serous secretion. The same destructive process is present as was observed in the bleeding duct, but it is not so far advanced

Puech P and Krebs E Traumatic Intracranial Serous Meningitis and Arachnoiditis (Ménin gites séreuses et arachnoïdites érephabque traumaticques) *J de chir* 1937, 50 749

Puech and Krebs look upon serous meningitis and arachnoiditis as one of the commoner end results of craniocerebral injuries. Classifying these complications as to being early or late, localized or diffuse in the vault or at the base (chiasmal or posterior fossa) the authors emphasize the difficulty of diagnosis offered by such pathology and point out the fact that without operative interference it may be confused in its early state with cerebral edema alone meningeal hemorrhage hematoma or the hypotension of the cerebro spinal fluid following a cranial injury. Its late appearance may cause it to be confused with tumors or old subdural hematomas.

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While the authors offer several theories as to the pathogenesis of this lesion of the meninges they obviously believe that the mechanism of its production is poorly understood. They suggest that the lesion may be a secondary cicatricial reaction of the arachnoid following mechanical injury of the arachnoid or the end result of a resorbed hematoma or more vaguely an irritative reaction of the arachnoid on a toxic or directly infectious basis. They stress however the importance in the patient's history of what may seem to be only an insignificant head injury and point out also that a chiasmal arachnoiditis for instance need not always result from trauma to that very region but may follow injury in a more remote portion of the head. JOHN MARTIN, M.D.

Davis L and Well A The Effect of Radiation Therapy Upon Intracranial Gliomas *Ann Surg* 1937 109 599

In an attempt to learn the true effects of radiation therapy upon intracranial gliomas 3 procedures may be followed

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In the comparison of untreated cases with 4 cases of glioblastoma which had been operated upon and treated with roentgenotherapy the impression was gained that the treated tumors were much more solid and, microscopically they had larger central areas of necrosis, with an increase in the stroma collagenic and argyrophilic fibers. At the periphery of the necrotic areas there was found an intense proliferation of tumor cells apparently not inhibited by radiation. In 1 case of medulloblastoma the authors found little evidence of radiation effect whereas in an ependymoma marked inhibition of tumor growth was noted. The authors were unable to note an appreciable difference in the survival periods of the treated and the untreated cases.

The use of radium therapy was tried in 14 cases. Cross fire radiation was employed over two areas of the skull. Each patient received 2000 mgm. hours per day until a total of 160000 mgm. hours had been received through the two portals. With this therapy the clinical impression was gained that the cases treated by radium progressed more satisfactorily than a similar group treated by roentgenotherapy or left untreated. This impression was not substantiated however when subjected to typical analysis against the authors' records.

In the discussion of the paper the senior author makes the following cogent remarks. We must maintain a scientific attitude toward the problem of radiation therapy in intracranial gliomas. We must require the same criteria as are required in a physiological experiment. We must know as accurately as possible how much of the tumor has been removed surgically. We must know accurately the histological character of the tumor before roentgenotherapy. We must know the exact amount of radiation therapy given and we must make an effort to study the brain or any remaining tumor after radiation therapy has been given. Such cases must be compared accurately with cases in which the tumor has a similar cell type but in which no radiation therapy has been given. Only after these exacting conditions have been fulfilled and correlated with the clinical course will we be able to state accurately and definitely the effect of radiation therapy upon gliomas. JOHN V. LUTZ, ELLIOT M.D.

that the condition is by no means hopeless, and in those cases in which invasion of the lymph nodes had not occurred at the time of operation, the results were satisfactory

The second special study was made in a group of 55 cases. The three, five, ten and fifteen-year survivals from the time of operation were determined. The survivals following the birth of the first baby were determined from one to fifteen years after the birth of the baby. Of the 37 patients of the second series who were traced, 33 lived one or more years after the birth of the baby, and of 12 patients whose babies were born fifteen years or more before the time of the inquiry, 7 had survived. This group is of particular interest because it establishes the fact that patients may survive many years following childbirth and may have as many as three deliveries following operation for carcinoma of the breast. The operative results in this group were satisfactory and the final results were found to be more satisfactory than those of the entire series.

It is difficult, and may be hazardous, to draw any definite conclusions from this study other than what has been stated above, namely, that it is possible for patients to bear children following radical amputation of the breast and to live for many years without recurrence of the carcinoma of the breast. However, Harrington does not believe that it should be inferred from this study that pregnancies subsequent to radical amputation may not be followed by metastatic malignancy. It must be remembered that these cases in reality constitute a selected group, inasmuch as all patients who give birth to children at full term must have survived operation approximately a year, and usually patients who survive that long are in good general condition. This eliminates many of the patients whose malignancy is of high grade. This unintentional selectivity increases by necessity as the interval increases from the time of operation.

Although the results in this series were far better than it was expected they would be, the author will continue to advise young women who are in the child-bearing period of life not to have subsequent pregnancies after radical amputation of the breast. It is gratifying, however, to know that if pregnancy does develop subsequent to radical amputation, the patient may give birth to babies at full term and that metastatic malignancy may not develop as a consequence. In these cases the prognosis is probably more favorable if the patient does not nurse the baby.

Sailer, S : Sarcoma of the Breast. *1m J Cancer*, 1937, 31 : 183

Sarcoma of the breast is comparatively rare. Standard texts state that from 0.5 to 9.0 per cent of all malignant tumors in the breast are sarcomas. At St. Luke's Hospital in New York, the proportion was 1 sarcoma to 125 carcinomas, or 0.8 per cent. The total number in thirty-five years was 15 sarcomas.

Spindle-cell fibrosarcoma occurred 5 times. These tumors were rather characteristically uniform in

structure, both grossly and microscopically, and showed the greatest differentiation of the entire series. Two of them appeared in pre-existing fibroadenomas and showed a slow growth until malignant change became evident.

Fibromyxosarcoma was found in 2 cases. These tumors showed marked differences in their amount of myxomatous tissue. One patient in whom the production was abundant ran a rapid downhill course with local recurrence and pulmonary metastases.

Neurogenic sarcoma was found in 1 case only. It was diagnosed as neurogenic in origin, and although no nerve filaments entering the growth were demonstrable, the microscopic structure appeared to warrant the diagnosis.

Polymorphous-cell fibrosarcoma was present in 3 cases. These tumors showed little differentiation histologically, and appeared to be rapidly infiltrating in nature.

One rhabdomyosarcoma, which occurred primarily in the breast, was reported. The only other similar case in all the literature was one reported by Billroth in 1860, involving a girl sixteen years old. The present case was that of a colored woman thirty-eight years old. She noticed a lump in her left breast, which apparently disappeared, but returned ten months later. It grew rapidly, and was removed only to recur seven months later. It was again extirpated, and three weeks later the patient was seized with generalized abdominal cramps, vomiting, and other signs of incomplete intestinal obstruction. After two weeks she died. At autopsy, an ulcerated mass was found in the left axilla. Tumor nodules studded the pleural surfaces of both lungs, infiltrated the tracheobronchial nodes, and were scattered through the lung tissue. The liver contained two nodules. A hard, pedunculated tumor projected from near the greater curvature of the stomach into its lumen, and nearby was a smaller mass in the mucosal wall with ulceration of its surface. Two similar nodules projected into the lumen of the jejunum, one of which, near the ileocecal valve, had caused the intussusception. A microscopic section of the original tumor was practically identical with the axillary recurrence at autopsy. Both showed large myoblasts having a granular cytoplasm and deep-staining nuclei, and both were centrally and eccentrically placed. Scattered about were occasional elongated ribbon-like fibers with distinct longitudinal striations. Between these were small polyhedral spindle cells and still smaller round cells, as well as strands of connective tissue which showed some leucocytic infiltration. The nodules in the liver showed elongated muscle fibers with distinct striations, as well as round, spindle, and polyhedral cells, similar to those in the original tumor. The same was true of the tumor tissue from the lungs, the stomach, and the intestine.

The mixed tumors were three in number. Two were of the mesodermal type, and one contained both proliferating ectodermal and mesodermal derivations. There was one chondromyxofibrosarcoma.

of the 6 cases. The 2 cases without recovery were streptococcus infections, which did not respond to staphylococcus antitoxin treatment and were treated therefore by the usual surgical measures. They were in a sense, control cases.

The authors are enthusiastic about the antitoxin form of treatment of breast abscess, and have become convinced of the specificity of its action in most of their cases. The invading organism is usually found to be the one which may be cultured from the skin of the patient it having gained admission through the opening in the nipple or through fissures in the nipple at the time of lactation. In 8 cases the cure was complete in from six to forty days without scar, residual fistula or intraglandular induration. The serum obtained from the Pasteur Institute, is injected in 4 doses according to the technique of Ramon in his treatment of cutaneous staphylococcus infections.

JOHN MARTIN M.D.

Keynes G. The Place of Radium in the Treatment of Cancer of the Breast. *Ann Surg* 1937, 106 619

In 1922 Keynes started to treat cancer of the breast with interstitial radium alone. For the first two years he considered only cases with recurrent disease following operation, because of the good results obtained; however, the treatment was extended for the next four and one half years to very advanced or inoperable primary tumors of the breast, and later to all types of carcinoma of the breast, either alone or with conservative surgery.

The radium has always been applied with needles. The usual distribution of the needles is shown in an illustration but not actually described in the text. No radon has been used. In those instances in which surgical operation was also employed it preceded irradiation as a rule and was performed with the diathermy needle. No dissection of the axilla has ever been carried out. The procedure has finally been condensed into the following general rules:

1. If the tumor is large or the diagnosis is uncertain, local removal of the tumor followed by radium treatment is indicated.

2. If the tumor is very bulky, local removal of the breast followed by radium treatment is indicated.

3. The axilla must never be dissected.

4. Radium treatment alone may be used (a) if the tumor is of moderate size and the diagnosis is certain and (b) if the patient refuses operation.

If the carcinoma extended to the supraclavicular lymph nodes or even further the case was considered as unsuitable for treatment by radium.

For statistical purposes the cases were divided into 3 groups:

I. Disease apparently confined to the breast.

II. Disease apparently confined to the breast and axilla.

III. Disease advanced or inoperable.

The total number of patients treated up to the end of March 1937 was 325 and if the cases of

the last three years are excluded the total was 200. The percentage survival rates among these 200 cases were as follows:

Percentage of Patients Alive After Three Years

Group	Number	Survival Percentage	U. C. H. I. survival percentage
I	85	83.5	70.4
II	91	59.3	52.3
III	74	51.4	

Percentage of Patients Alive After Five Years

Group	Number	Survival Percentage	U. C. H. I. survival percentage
I	75	77.4	69.1
II	66	49.3	30.5
III	60	43.6	

U. C. H. I. column costs as a comparable series of 200 in the number of patients treated by surgery also at the University College Hospital.

It appears from these figures that in Group I the survival rate for radium is substantially higher than for operation alone. In Group II it is approximately the same, and in Group III no suitable surgical group was found for comparison since patients belonging to that group are judged as being inoperable. The higher rate in Group I is attributed to the lower postoperative mortality and especially to the fact that the interstitial administration of radium acts upon the cancer cells without disturbing them and thus without disseminating the disease.

Aside from the better results, the advantages of the conservative treatment are that only slight mutilation of the breast follows, that there is practically no postoperative mortality or shock and that lymphatic edema of the arm never develops. The disadvantages are the difficulty of interpretation of the results, postirradiation fibrosis and the increased liability to neuralgia or rheumatic pain in the treated areas.

T. LEONETTI M.D.

Harrington S. W. Carcinoma of the Breast. Results of Surgical Treatment When the Carcinoma Occurred in the Course of Pregnancy or Lactation and When Pregnancy Occurred Subsequent to Operation (1910-1933). *Ann Surg* 1937, 106 690.

A complete study has been made of all of the cases of carcinoma of the breast in which operation was performed at the Mayo Clinic between 1910 and 1933. Of this entire group special studies were made on two series of cases: (1) cases in which the malignancy was present in the course of lactation or pregnancy and (2) cases in which pregnancy occurred subsequent to radical amputation of the breast.

The first special study was made on a group of 92 cases to determine the results of operative treatment and it was found that the results of operation in these cases were not as satisfactory as the results in the entire series of cases in which operation was performed from 1910 to 1933. The results indicate

ology, pathogenesis, clinical manifestations, diagnosis, and treatment of malignant tumors of the lung. A variety of clinical and autopsy records are presented with numerous roentgenograms and a thorough bibliography. This is a most instructive and up-to-date consideration of this important subject.

JACOB E. KLEIN, M.D.

Roeckpe, W. Long Standing Recovery after Operation on a Pulmonary Carcinoma (Mehrjährige Heilung nach Operation eines Lungencarcinoms) *Zentralbl. f. Chir.*, 1937, p. 803

In the first case which the author describes a tumor in the upper lobe of the lung was found after a metastasis in the pectoral lymph nodes was removed. The operation went along smoothly. Eight weeks later, because of a bronchial fistula, empyema set in, but was cured. The patient, a woman, died four and one-half months later from a brain metastasis.

In the second case the patient was a sixty-five-year-old woman, in whom an oophorectomy was done in 1930 for malignancy of the ovary. The histological study at that time revealed a pleomorphic carcinoma. In 1933, there was an isolated metastasis in the right lower lobe. A firm, lumpy tumor with infiltrations into the lung tissue was removed. Primary wound healing occurred. Histological study revealed the same kind of tumor as was removed with the ovary. According to the cell character it was probably a Grawitz tumor primary in the region of the ovary. The woman is alive and healthy, at present, three and one-half years after the operation. (STARK) PHILIP SHAPIRO, M.D.

HEART AND PERICARDIUM

Nissen, R. Questions of General Interest in Heart Surgery (Linje allgemein interessierende Fragen aus der Chirurgie des Herzens) *Schwets med. W. chinschr.*, 1937, 2: 851

Experiences in injuries. According to collective statistics, the mortality in heart injuries treated surgically amounted to about 50 per cent. Nissen himself operated in 7 cases with 2 deaths. Nothing was found on the posterior wall of the right auricle of the first patient who died, the second patient died sixteen days later from purulent pericarditis and empyema. In 40 per cent of all cases a pericardial effusion was present. This is difficult to explain for Nissen never found a spontaneous closure of the pericardium. In 4 cases, however, there was a true mediastinal gun-shot track, that is, the pericardium was injured at a point where there was a counter-pressure against the sternum, costal cartilage, or intercostal musculature. The duration of the effusion varied. At first, the respiration and pulse were not always essentially affected. Circulatory insufficiency occurred suddenly. Electrocardiographic examinations after suture showed tracings like those of cardiac infarct although no coronary branch had been ligated. In this connection, the author pre-

sented 3 cases observed by himself, in a fourth, however, the outer branch of the left coronary artery had been ligated. Nissen cited a case in which a like electrocardiogram was produced by a darning needle which had perforated the anterior and posterior walls of the right ventricle and remained *in situ*. It was remarkable that in his own 4 cases these electrocardiographic changes had completely disappeared after ten days.

Intervention because of valvular defects. Cutler and Santar each, in 1 case, converted a stenosis into an insufficiency with doubtful early result. Further operative efforts in this direction have not been made. On the other hand, experimental excision or splitting of the pericardium has been tried in mitral and tricuspid insufficiency. This, however, was a double-edged procedure. In aortic stenosis and arterial hypertension, on the contrary, Felix performed experimental plication of the pericardium with paralysis of the diaphragm. This too failed in its purpose.

Operation for massive lung embolism. Eichelher collected 160 cases with 9 recoveries. The greatest difficulty was the diagnosis, for it was certain that many patients died from the Trendelenburg operation *per se* who otherwise would probably have recovered spontaneously. Operation should be deferred to the last moment.

Treatment of coronary sclerosis. Improvement of the myocardial circulation was attempted by means of plastic muscular flaps taken from the anterior chest wall and sutured to the myocardium by Beck, Tichy, and Moritz. In 11 operations Beck had 5 deaths and 4 notable improvements. O'Shaughnessy performed cardio-omentopexy in 6 cases with 2 deaths and 3 quite satisfactory results. Lezius produced experimental adhesions between the anterior surface of the heart and the lower lobe of the left lung. The last procedure requires further investigation.

Sequelæ of pericarditis. The author discussed the various forms of these sequelæ and the indications for operation (typical precordial thoracotomy of Brauer and Delorme's decortication). In 5 decortications Nissen had only 1 complete success. He considered the radical excision of all indurated tissue to be unwise. A moderate layer of connective tissue should be left to replace the pericardium. The proper order of decortication, first left, then right, advised by Schmieden, was not of great importance. The difference in the dilatability of the ventricles and consequently the causes of the insufficiency following stasis, were determined by the anatomical peculiarity of the two ventricular walls.

Liberation of the heart from extrapericardial pressure. The results were more favorable because the organ was a healthy one. Nissen published 4 roentgenograms of patients upon whom he operated successfully. The pressure had been caused by lymphocysts of the lower mediastinum lying upon the base of the heart, with stasis in the area of the superior vena cava, and fibroma of the lower mediastinum,

one osteochondrofibrosarcoma and one carcinosarcoma

J DANIEL WILLEMS M D

TRACHEA LUNGS, AND PLEURA

Livraga P. *Clinical Study on the Diagnosis and Treatment of Malignant Tumors of the Lungs* (Studio clinico sulla diagnosi e terapia dei tumori maligni del polmone) *Arch ital di chir*, 1937 47 63

The author points out the significance of early diagnosis of malignant tumors of the lungs with regard to the possibility of proper treatment. He insists that the condition be kept in mind in order that early diagnosis may be made. One of the obstacles to early diagnosis is the preconceived notion that the condition is rare. Primary carcinoma of the lungs is most frequent between the ages of forty five and fifty five years and there is a preponderance in the male sex. Many factors and variables enter into the etiology and pathogenesis. Among these may be included hereditary predisposition, occupation, the trades, dust chemicals such as naphtha and benzene, aniline and paraffin.

As concerns the clinical manifestations a dry, spasmodic cough with viscous pearly sputum tinged with blood in a male over forty years of age with no tuberculosis or other reasonable cause of cough is one of the early symptoms which should lead to the suspicion of pulmonary carcinoma. There may be pain of a constricting nature. When the mediastinum is involved there may be severe respiratory difficulty with even asthmatic symptoms. Hemoptysis is not rare and sometimes may be severe enough to endanger life.

Early respiratory difficulty may be due to massive atelectasis of the lungs or occlusion of a bronchus. Later paralysis of the phrenic nerve may cause respiratory difficulty. In advanced cases there may be paralysis of the recurrent laryngeal nerve and even paroxysms of cardiac palpitation. Compression of the phrenic nerve is exceptional in benign tumors. Involvement of a superior pulmonary lobe may affect the sympathetic nervous system with a resultant oculophrenic recurrent nerve syndrome.

Findings on local thoracic examination are variable. Walke has described retraction of the chest wall in cirrhotic or atelectatic cases. Vocal fremitus is at times increased. There is ordinarily dullness on percussion auscultation may reveal bronchial breath sounds and sometime *mottlés*. At other times there may be an abolition of fremitus, diminution of the breath sounds, or absence of the breath sounds when the neoplastic proliferation has led to occlusion of a large bronchus with resulting atelectasis. Fever may occur as the result of secondary infection of the tumor.

In the author's experience the following are important aids in the diagnosis of pulmonary carcinoma: the characteristic dry spasmodic cough with blood tinged sputum in the absence of tuberculosis; a sense of oppression in the thorax; enlargement of

the supraclavicular and axillary lymph glands and intercostal and pleural pains. In advanced cases superficial lymph gland metastases may reveal the condition. Stropeni made the diagnosis in a seventy five year old woman with subcutaneous metastases in the epitrochlear region.

As concerns the site the tumor more commonly arises in a bronchus and secondarily invades the pulmonary parenchyma. Central alveolar carcinoma of the lung is more rare; it reaches the hilum through the lymphatics. Alveolar carcinoma tends to spread to the periphery and the pleura. These regions are particularly favorable for radical treatment.

Important aids in diagnosis are x ray examination, bronchoscopy, and bronchography. Blood examination usually shows an eosinophilia due to compression of the vagus. The author prefers Sauerbruch's exploratory thoracotomy to trocar punctures for biopsy examinations. The former permits therapeutic intervention if that becomes necessary.

In differential diagnosis we must consider all subacute and chronic diseases of the lungs which are accompanied by infiltration or cavitation; these include especially tuberculosis, chronic inflammation with delayed resolution, actinomycosis, syphilis, aneurism of the aorta, bronchiectasis, pulmonary abscess, gangrene, and echinococcus cyst as well as sarcomas. The variety of pulmonary pathology offers considerable possibility for diagnostic error. Cavalozzi at the Institute of Pathologic Anatomy at Milan (1925-1932) reports 34 cases in which there was a correct clinical diagnosis in 25.4 per cent; the condition was suspected in 11.8 per cent and completely missed in 45.4 per cent. A difficult condition to diagnosis is pulmonary cancer with cavitation. In fact pulmonary cancer may be present as a cavity opening into a bronchus almost identical in general symptomatology, findings, and x ray appearance to simple suppuration. In fact Fjorberg has propounded the aphorism that in all pulmonary suppuration after forty years of age we should suspect the existence of pulmonary cancer. It has been recorded that emphysema may coexist with a carcinoma and mask the existence of the latter.

Sarcoma is not rare and its physical appearance in the roentgenogram may be confused with echinococcus disease. It is important to differentiate between primary and metastatic pulmonary carcinoma.

The author describes various thoracic operations including superior mediastinotomy. He notes that Sauerbruch's two stage and three stage operation has lowered the mortality rate to from 10 to 15 per cent. He further emphasizes that one stage lobectomy is to be done in pulmonary carcinoma only in the absence of infection and in the presence of a free pleura.

In conclusion it may be stated that the author bases his essay on his experience at the Surgical Clinic of the University of Berlin under Sauerbruch's direction. He discusses in detail the eti-

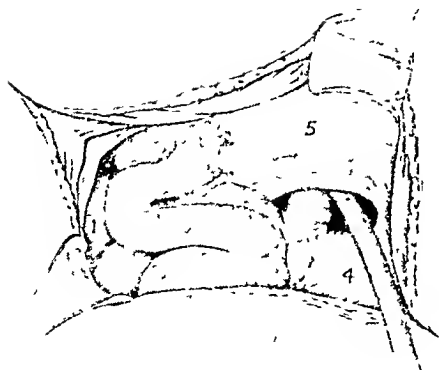


Fig 1 Displacement of intestines from the thorax by introduction of rubber tube through hiatus

ment of the heart, and absence of breath sounds over the affected side. The x-rays will establish the diagnosis definitely.

One of the most troublesome technical difficulties in the surgical repair of these cases is the closure of large defects. The renal fascia may, at times, be of inestimable value in this connection. The mobility and expanse of this tissue is sufficiently great to permit closure of large defects, even to the degree of complete absence of a hemidiaphragm.

The technique of the operation is as follows:

The infant is placed in an anterolateral position with the head down. A lateral abdominal incision is made along the inferior costal margin from the sternum to the longitudinal muscles of the spine. As a general rule the spleen and most of the gastrointestinal tract are within the thorax. These structures are displaced by introducing a rubber tube of about $\frac{5}{8}$ in in diameter through the aperture. The air which enters the thorax through the tube is apparently all that is needed to overcome the negative pressure induced by respiration, the force which has sucked the intestines into the thorax. After the abdominal viscera are dislodged, positive pressure anesthesia is started. The abdominal viscera are

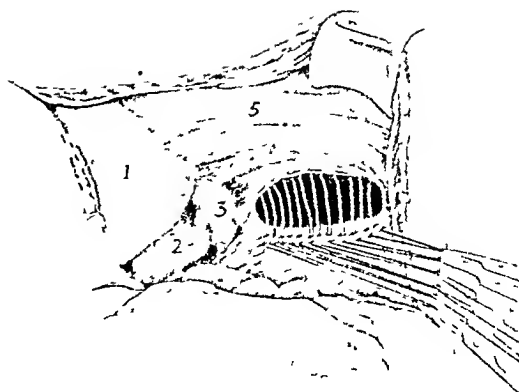


Fig 2 Interrupted silk sutures inserted in the anterior border of the hernial ring and in the renal fascia. The intestines, covered with wet gauze, are placed outside of the abdomen.

placed in gauze soaked in warm normal saline solution, which leaves the abdominal cavity empty to facilitate inspection and repair of the defect. Small forceps are spaced at intervals of about $\frac{3}{4}$ in along the anterior border of the hernial ring. The broad expanse of renal fascia which now lies completely exposed is grasped with forceps and raised upward to meet the anterior border of the hernial ring. Interrupted mattress sutures of No. 9 silk are placed sufficiently close together to assure complete approximation of the edges along the line of closure. After the sutures are tied, the intestines are returned to the abdomen, and placed as nearly as possible in their normal relationship. After suturing the fascial layers of the abdominal wall with interrupted O chromic gut, the skin is approximated. Before the infant leaves the operating room, air is withdrawn from the pleural cavity by means of an aspirating needle and syringe.

The aftercare is directed chiefly toward restoring the normal body fluids which have become depleted because of difficulty in feeding, and toward maintaining adequate oxygenation. SAMUEL KAHN, M.D.

gastrocardiac syndrome with esophagospasm. He also reported a case of successful bilateral chondrotomy for pectus carinatum. In funnel breast in fundibular thorax the depressed sternum could be mobilized by the Sauerbruch Nissen operation and by continuous traction, held in the improved position until healing occurred. Compression of the heart by mediastinal emphysema and by the curative jugular incision was mentioned.

Gastrocardiac syndrome epidiaphragmatic syndrome. The author rejected von Bergman's opinion that in these conditions the fibers of the vagus are stimulated and cause coronary stenosis. These anginous pains may persist notwithstanding dilatation or operative treatment of the cardia. With this spastic reaction type Nissen contrasted the atonic form represented by mega esophagus which he observed several times in connection with atony of the heart and blood vessels. Any major surgical procedure is prohibited.

Organic heart disease and thyroidectomy. The author questions the theoretic manifestations. Practically the results except in angina pectoris are said to be immediately apparent. The author observed some favorable cases but the signs of impaired function are not to be underestimated. They occurred in 85 per cent of the cases and necessitated the continuous administration of thyroid extract. At any rate the operative indication should be restricted to organic heart disease with unfavorable prognosis. In angina pectoris removal of the stellate ganglion, paravertebral ganglionectomy, or novocaine injection should be considered before thyroidectomy. If subtotal thyroidectomy were equally successful the situation would be different. (FRANZ) J. M. SALMON, M.D.

Grassi, A. An Experimental Contribution to the Study of the Reestablishment of the Cardiac Circulation by Means of Live Muscle after Ligation of the Coronary Arteries (Contributo sperimentale allo studio del ristabilimento della circolazione cardiaca a mezzo di muscolo vitale previa legatura delle coronarie). *Arch. ital. di chir.* 1937 47 234.

Stimulated by the work of Beck on the establishment of collateral circulation in the myocardium, Grassi conducted a series of experiments in rabbits to study this circulation. The experiments consisted of attaching to the myocardium the pectoralis minor in some animals, the pectoralis major in others, and the omentum in still others, in an attempt to establish a source of blood supply for the myocardium other than that of the coronary arteries. Along with this procedure one or more of the coronary arteries were ligated. Fourteen animals were operated upon, 10 survived the operation. The left coronary artery and a large branch of the right coronary artery were ligated simultaneously. The animals were sacrificed as long as six months after the operation. The muscle grafts always took hold readily and early. Microscopic sections re-

vealed very little degenerative change in the muscle of the heart. The adhesions which were inevitable to the procedure caused no difficulty in the mechanics of the heart. The adhesions of the pericardium to the heart also carried some blood vessels. Electrocardiographic tracings made before, during, and after the operation indicated that changes in the conduction occurred only during the operation. Late tracings revealed minimal changes in conduction. A. LOUIS ROSE, M.D.

MISCELLANEOUS

Dunhill, Sir T. P. Some Abnormalities of the Pharynx, Esophagus and Diaphragm (including Diaphragmatic Hernia). *Brit. J. Radiol.* 1937 10 707.

The common abnormality in the pharynx is the pouch too often called an esophageal pouch (diverticulum). The protrusion occurs between the transverse and oblique bundles of the inferior constrictor muscle of the pharynx. The author prefers a one-stage operation and performs a preliminary gastrotomy if the patient is starved. He reports 11 cases without an operative death. Carcinoma may occur in the pharyngeal pouch.

A short esophagus with a partial thoracic stomach is not so rare and the author has observed 10 of these cases. A long history of dysphagia tends to rule out carcinoma as a cause of the symptoms. Radiological evidences are stenosis, dilatation of the esophagus and ulceration. The symptoms are pain above the left costal margin, discomfort, and a feeling of utter helplessness, probably because the thoracic loculus causes great pressure on the heart and pericardium. The diagnosis is not easy and depends on the x-ray findings.

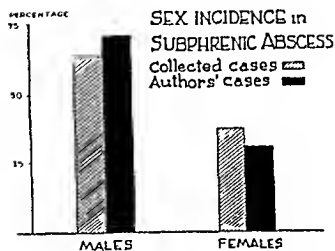
The author demonstrated radiological findings in the various types of diaphragmatic hernia. EARL O. LATIMER, M.D.

Weinberg, J. Diaphragmatic Hernia in Infants. Surgical Treatment with the Use of Renal Fascia. *Surgery* 1938 3 78.

Until very recently congenital diaphragmatic hernia occurring in infants was not thought to be within the possibility of surgical repair. One of the reasons for the low development of surgical treatment at such an early age is the erroneous impression that infants do not tolerate extensive procedures within the abdomen or thorax.

When it is considered that most infants with congenital diaphragmatic hernia do not live beyond the first few months, however, it is obvious that a different attitude must be taken.

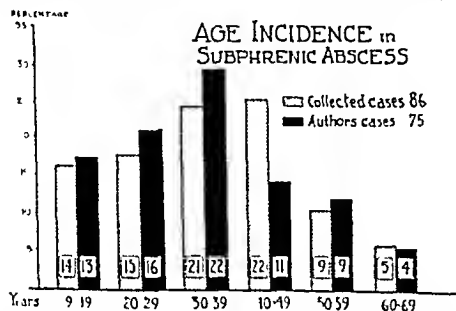
Difficulty in breathing immediately after birth should always suggest the possibility of a defect in the diaphragm. This symptom may moderate after a few days only to reappear in a few weeks or months. There will usually also be difficulty in feeding and failure to gain weight normally. The chief physical signs are a small abdomen, displace-



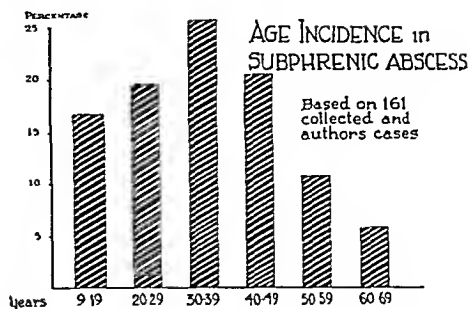
Graph I. Graphic representation of sex incidence in 102 collected cases (2-5, 7, 8, 13-25) and 75 of the authors' cases

per cent of the collected cases and 5.3 per cent of ours. Still rarer was the extension of thoracic lesions into the subphrenic space. Whereas this occurred in none of our cases, it was found in 8.9 or 2.5 per cent of the collected cases. That trauma may also be a rare etiological factor was revealed by the fact that it was present in 7.6 or 2.1 per cent of the collected series and in 1 or 1.3 per cent of our own (Graph IV).

Because one of the most frequent causes of all subphrenic abscesses is suppurative lesions of the appendix, it is of interest to determine the incidence of subphrenic abscess following acute appendicitis. In the previous report there were collected from the literature 11,017 cases of acute appendicitis, of which 130 had a complicating subphrenic abscess. Since then Janz (26) and von Szacsavay (9) have reported 2,452 cases of acute appendicitis with 5 subphrenic abscesses and 1,500 cases with no subphrenic abscess, respectively. Thus, subphrenic abscess occurred as a complication of acute appendicitis in about 0.9 per cent of approximately 15,000 collected cases. Whereas the result of this statistical analysis would minimize the incidence of subphrenic abscess as a complication of suppurative lesions of the appendix, attention must be directed to the fact that the majority of infections of the subphrenic space



Graph II. Comparative age incidence in 86 collected cases (2-5, 7, 8, 13-25) and 75 of the authors' cases

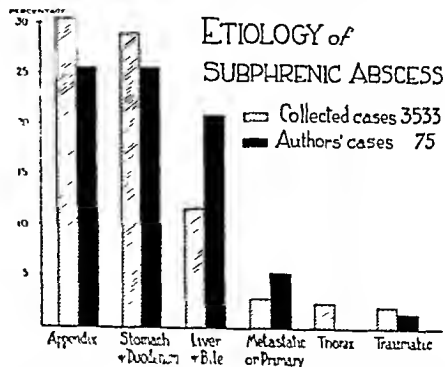


Graph III. Graphic representation of age incidence based on 161 collected and the authors' cases

resolve spontaneously (27). Thus, in many of these cases the subdiaphragmatic complication is not even suspected and obviously never diagnosed. For this reason these ostensibly insignificant figures should not be permitted to lull one into the deceptive belief that subphrenic complications are rare in suppurative lesions of the appendix.

Whereas the micro-organisms most frequently obtained from subphrenic abscess are the colon bacillus, streptococcus, and staphylococcus, the bacteriological agent will vary according to the original lesion. In the series reported by Lehman and Archer (2) the bacillus coli was present in 29.4 per cent, the streptococcus in 23.4 per cent, and the staphylococcus in 23.4 per cent. In the cases of our own series in which positive cultures were obtained these organisms occurred in 40 per cent, 40 per cent, and 20 per cent, respectively.

Obviously the mechanism of the spread of infection to the subphrenic spaces varies according to the original lesion. In general, however, these routes of extension are rarely through vascular channels from neighboring or distant foci, but



Graph IV. Comparative incidence of most frequent original lesions in subphrenic abscess based on 3,533 collected cases (1-25) and 75 of the authors' cases

SUBPHRENIC ABSCESS

Collective Review and an Analysis of 3,608 Collected and Personal Cases

ALTON OCHSNER, M.D. F.A.C.S. and MICHAEL DeBAKEY, M.D. New Orleans, Louisiana

THE great interest manifested in subphrenic abscess during the past decade by surgeons throughout the world is obvious evidence of its preeminence as a late complication of intra abdominal suppurative processes. This interest has been due in great measure to the consistently high operative mortality rate which is indicative of inadequacy in diagnosis and employment of improper operative procedures. Obviously there is an increase in mortality commensurable with the delay in recognition of a condition demanding surgical intervention. Similarly, the less rational the operative procedure is the less likely it is to be successful. Thus, the mortality rate of this important condition can be lowered only by early and adequate diagnosis and the utilization of the most rationally applicable operative procedure.

In 1933 one of us with Graves (1) presented an analysis of 3,312 cases collected from the world literature and 50 additional cases treated in the Charity Hospital and the Touro Infirmary in New Orleans. Since then there have been published in the world literature 211 additional cases and 25 additional cases have been treated in the aforementioned New Orleans institutions which brings the total number of recorded cases to 3,608. The present report is concerned primarily with an analysis of the more recent personal series of 25 cases as compared with the previous group of 50 cases, and secondarily with a systematic survey of the 3,533 collected cases.

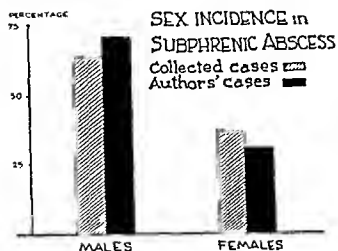
A consideration of the racial incidence of subphrenic abscess in the world literature is not available. In the 20 cases recently reported by Lehman and Archer (2) there were only 3 negroes. Our present report of 25 cases consists of 5 cases treated at the Touro Infirmary where negroes are not admitted and 20 cases treated at the Charity Hospital where negroes comprise approximately one half of all admissions. This latter group plus the previously reported 30 cases (1) treated at the Charity Hospital gives a total of 50 cases, of which 29 (58 per cent) were white and 1 (2

per cent) were colored. These figures do not appear very significant.

The sex incidence reveals a preponderance of occurrence in the male and is probably due to a correspondingly greater incidence of the original lesion in the male. Whereas of 102 recently reported cases (2-5, 7, 8, 13-25) in which the sex was noted, there were 65 males (63.7 per cent) and 37 females (36.2 per cent) of the total 15 personal cases there were 52 males (60.3 per cent) and 23 females (30.6 per cent) (Graph I).

On the basis of 86 collected cases (2-5, 7, 8, 13-25) in which the age was noted subphrenic abscess occurred most frequently in the fifth decade and next most frequently in the fourth. The fourth and third decades had respectively the highest and next highest age incidence in our 75 cases (Graph II). However, a better estimate of the age incidence is represented by Graph III which is based upon 161 cases or a total of the collected and personal cases and reveals the fourth decade as having the highest incidence of occurrence and the fifth and third decades the next highest, respectively. In the collected cases the youngest patient was fourteen months (3) and the oldest was seventy six years (4), whereas in our own cases the youngest was nine years and the oldest sixty seven years.

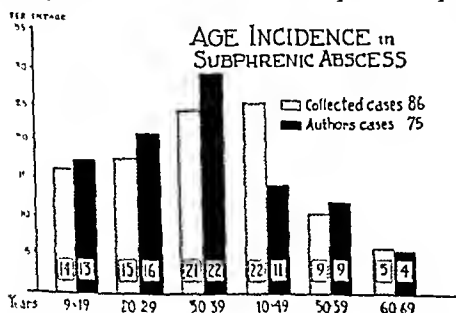
That subphrenic abscess is primarily a complication of an intra abdominal suppurative process is clearly revealed by the fact that of 3,608 collected cases including 75 of our own, the primary lesion was in the abdomen in 84 per cent of the cases (2-25) (Chart I). Still more significant is the fact that well over half of all subphrenic abscesses are the result of suppurative lesions of the appendix and perforative lesions of the stomach and duodenum. Of the 3,533 collected cases the origin was from the appendix in 30.9 per cent and from the stomach and duodenum in 28.7 per cent whereas in our 75 cases the origin from each was 23.3 per cent. The next most frequent cause was lesions of the liver and biliary passages. These lesions occurred in 12.6 per cent of the collected cases and 21.3 per cent of ours (Graph II). In occasional instances subphrenic abscess was of primary or metastatic origin. This occurred in 3.1



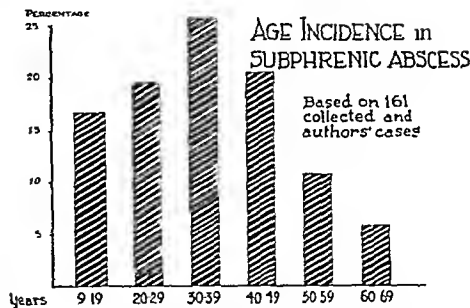
Graph I Graphic representation of sex incidence in 102 collected cases (2-5, 7, 8, 13-25) and 75 of the authors' cases

per cent of the collected cases and 53 per cent of ours. Still rarer was the extension of thoracic lesions into the subphrenic space. Whereas this occurred in none of our cases, it was found in 89 or 25 per cent of the collected cases. That trauma may also be a rare etiological factor was revealed by the fact that it was present in 76 or 21 per cent of the collected series and in 1 or 13 per cent of our own (Graph IV).

Because one of the most frequent causes of all subphrenic abscesses is suppurative lesions of the appendix, it is of interest to determine the incidence of subphrenic abscess following acute appendicitis. In the previous report there were collected from the literature 11,017 cases of acute appendicitis, of which 130 had a complicating subphrenic abscess. Since then Janz (26) and von Szacsavay (9) have reported 2,452 cases of acute appendicitis with 5 subphrenic abscesses and 1,500 cases with no subphrenic abscess, respectively. Thus, subphrenic abscess occurred as a complication of acute appendicitis in about 0.9 per cent of approximately 15,000 collected cases. Whereas the result of this statistical analysis would minimize the incidence of subphrenic abscess as a complication of suppurative lesions of the appendix, attention must be directed to the fact that the majority of infections of the subphrenic space



Graph II Comparative age incidence in 86 collected cases (2-5, 7, 8, 13-25) and 75 of the authors' cases

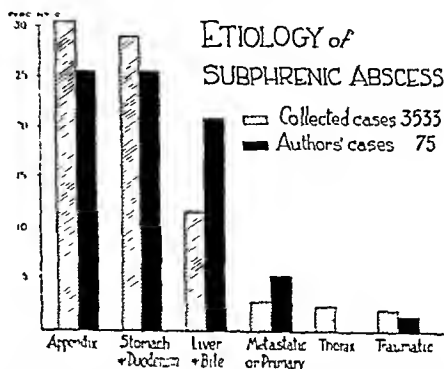


Graph III Graphic representation of age incidence based on 161 collected and the authors' cases

resolve spontaneously (27). Thus, in many of these cases the subdiaphragmatic complication is not even suspected and obviously never diagnosed. For this reason these ostensibly insignificant figures should not be permitted to lull one into the deceptive belief that subphrenic complications are rare in suppurative lesions of the appendix.

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Obviously the mechanism of the spread of infection to the subphrenic spaces varies according to the original lesion. In general, however, these routes of extension are rarely through vascular channels from neighboring or distant foci, but



Graph IV Comparative incidence of most frequent original lesions in subphrenic abscess based on 3,533 collected cases (1-25) and 75 of the authors' cases

ETIOLOGY

	Appendix	Stomach and Duodenum	Liver and Bile Passage	Spleen	Pancreas	Kidney	Intestine	Female Genitalia	Metastatic	Respiratory	Thorax	Miscellaneous	Unknown	Tuberulous	Number
Previously Collected (1)	1020	964	399	131	45	106	61	50	112	73	86	142	33	3311	
Per cent	30.7	29.4	12	4	1.4	3.3	1.9	1.5	3.4	2.2	2.6	4.3	1		
Recently Collected (2-25)	72	53	48	2	1		3	2		3	3	14		211	
Per cent	34.1	25.1	22.7	9	4		1.4	0		1.4	1.4	11.3			
Total Collected	1092	1017	447	133	46	106	64	52	112	76	89	256	33	3533	
Per cent	30.9	28.7	12.6	3.7	1.3	3	1.8	1.4	3.1	2.1	2.5	7.4	9		
Previous Own (1)	13	14	9					1	3	1		9		50	
Per cent	26	21	13					2	6	2		18			
Present Own	6	5	7	1			1	1	1		3			23	
Per cent	31	26	28	4			4	4	4		12				
Total Own	19	19	16	1			1	2	4	1		12		73	
Per cent	25.3	25.3	21.3	1.3			1.2	2.9	5.3	1.3		10			
Total Collected and Own	1111	1036	463	134	46	106	65	54	116	77	89	278	33	3608	
Per cent	30.7	28.7	12.8	3.7	1.2	2.9	1.8	1.4	3.2	2.1	2.4	7.4	9		

Chart I. Etiology in 3603 collected cases of subphrenic abscess including 75 of the authors. Cases originating from the gall bladder pancreas liver and intestine which were not separated in the original report are included in the collected series.

most frequently through intraperitoneal or extra-peritoneal direct invasion or lymphatic drainage.

Whereas it is readily agreed that the simple and most obvious mode of extension to the subphrenic spaces is by local invasion from contiguous lesions, there seems to be some controversy regarding the mode of extension from distant intra-abdominal lesions. Among the first to suggest that entrance to the subphrenic space may be gained by extension of infection from the right iliac fossa through the gutter between the ascending colon and the lateral parietal peritoneum were Eisendrath (28) Ullman and Levy (29), Lockwood (30), Nather (31) and Ochsner (32). Although more recently others (Bogart 7 Delano 33) have directed attention to this mode of extension Lehman and Archer (2) have attempted to impugn its validity. This dispute is based upon the contention that after a peritoneal inflammatory reaction is established there is little opportunity for fluids to flow and that this mode of extension is not consistent with the frequency of involvement over the dome of the liver without involvement in the subhepatic region. Whereas it is true that fluids are not likely to flow freely in the peritoneal cavity in that stage of inflammation in which the exudate has become fibrinous it must be recalled that before this phase has developed there is usually an exudative stage during which there occurs a pouring out of free fluid. It is during this stage that bacteria laden fluid can flow with facility. Moreover the frequency of involvement in the suprahepatic region as com-

pared to the infrahepatic region is probably due to local and mechanical factors. Whereas the infrahepatic space communicates freely with the general peritoneal cavity the suprahepatic space may be considered as more closely approaching a closed space and therefore more conducive to its development and progress of infections. This is particularly enhanced by the presence in this space of a negative pressure. Because of this and because of the respiratory excursions of the diaphragm with the consequent continuous motion being less conducive to splinting and physiological rest the suprahepatic region is more susceptible to infection. In this regard the recent suggestion of Overholt and Donchess (4) that during respiration there is created a negative pressure in the subphrenic region which serves to suck infection upward may play an important role. This factor is based upon rather ingenious experimental investigations of Overholt (34) and others (Melchior E and P 35) in which it was possible to demonstrate that pressure in this portion is negative during quiet respiration there being a greater negative pressure during inspiration than during expiration.

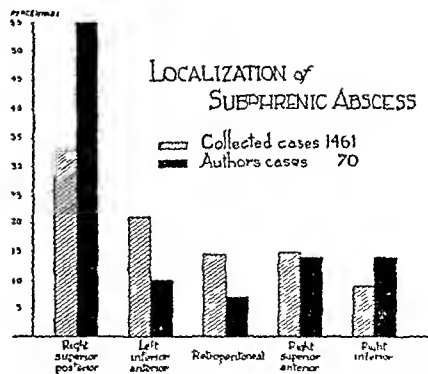
The other most common route of extension is by way of the lymphatics. Murro (36) has especially emphasized the role of retroperitoneal lymphangitis as a common means of infection whereas Parnard (37) has called attention to the lymphangitis of the vessels accompanying the deep epigastric arteries. In a recent excellent review and summary of the anatomical investigations on

the rich lymphatic supply of the liver and diaphragm, Truesdale (5) has clearly demonstrated the importance of the lymphatics as conveyers of infection to the subphrenic region.

Obviously other mechanisms of spread of infection to the subphrenic region are by direct introduction of a foreign body and by rupture of a liver abscess. Although Ludlow (38) in a review of 142 cases of amebic abscess of the liver found 13 cases (9 per cent) with rupture into the subphrenic space, in a group of 73 cases of amebic hepatic abscess previously reported by us (39), there were only 2 (2.7 per cent).

Whereas no attempt will be made here to give a detailed anatomical description of the subphrenic spaces, it is considered desirable to review briefly these regions. For such detailed study of the anatomy of this area, the reader is referred to the original accurate description of Martinet (40) and Barnard (41), and to previous personal publications (32, 42, 43, 44). According to such descriptions, the liver roughly divides the area between the diaphragm above and the transverse colon and mesocolon below into the suprahepatic and infrahepatic spaces, respectively. The coronary ligament divides the suprahepatic area into right and left portions. This right portion is divided by the right prolongation of the coronary ligament, the right lateral ligament, into two spaces: a large anterior one and a smaller posterior one. Thus in the suprahepatic region there are three spaces, the right anterior superior, the right posterior superior, and the left superior. Similarly, the infrahepatic area is also divided into three spaces and into right and left portions by the round ligament and the ligament of the ductus venosus. The large right inferior space is to the right of these structures and the left anterior inferior and left posterior inferior spaces, separated from each other by the stomach and the gastro-hepatic omentum, are to the left.

The most frequently involved space is the right posterior superior one. In a collected series of 1,461 cases in which this was noted, the right posterior superior space was involved in 33.7 per cent (Graph V). Of 20 cases in our present series in which the space involved was stated, 9 (45 per cent) had involvement of this space (Chart II). This space was involved in 39 (55.7 per cent) of our total of 70 cases. Probably the reason for the greater frequency of involvement in the right posterior superior space is the greater accessibility to inflammatory exudate coursing upward from the iliac fossa along the paracolic groove. Although in the 1,461 collected cases the next most frequently involved spaces were the left inferior



Graph V. Graphic representation of most frequent sites of localization of subphrenic abscesses in 1,531 collected cases (1, 3, 4, 7, 8, 11-25) including 70 of the authors'.

anterior and the right anterior superior, in our 70 cases the next most frequently involved spaces were the right inferior and right anterior superior. Several observers (1, 7, 25, 42, 45, 46) have noted the association of infection in the right posterior superior and right inferior spaces. Whereas in our previous 50 cases this was observed in 4 (8 per cent), in our present 20 cases this occurred in 2 (10 per cent). The intraperitoneal subphrenic abscesses occur much more frequently than the extraperitoneal. The latter type was present in 14.9 per cent of the 1,461 collected cases and in 7.1 per cent of ours (Graph V).

Although no attempt will be made here to give a detailed description of the clinical manifestations of subdiaphragmatic abscess, there are certain considerations worthy of emphasis from the diagnostic standpoint. The inaccessibility of the subphrenic region lends considerably to the difficulty in diagnosis. However, the frequent omission of and delay in the diagnosis are due in great measure to the failure to suspect its presence. Whereas it is true that in many instances an abscess will be suspected and a diagnosis even made in the absence of true abscess in the subphrenic region, it is our opinion that the majority of these cases develop subphrenic infections which subside spontaneously and never progress to abscess formation. This undoubtedly occurs much more frequently than is commonly supposed, for in our experience approximately 70 per cent of subphrenic infections which are diagnosed from the clinical manifestations subside without proceeding to suppuration. The possibility of subphrenic infection always must be strongly suspected in every patient with continued pyrexia and leucocytosis who has had an antecedent suppurative intraperitoneal process and in whom no

LOCATION OF SUBPHRENIC ABSCESS

	Right Anterior Superior	Right Lateral	Right Posterior Superior	Right Posterior Inferior	Left Anterior Superior	Left Anterior Inferior	Left Posterior Superior	Complicated	Total Cases
Previously Collected (1) Per cent	435 100	135 100	193 100	217 100	305 100	47 100	55 100	52 100	1387
Recently Collected (3 4 7 8 11-15) Per cent	50 100	5 100	29 100	1 100	10 100	4 100		7 100	74
Total Collected Per cent	485 33.1	140 9.5	222 15	218 14.0	315 21.7	51 3.7	55 3.8	59 4	1461
Previous Own (2) Per cent	30 60	7 13.5	4 8	4 8	4 8		1 2	4 8	50
Present Own Per cent	9 45	3 15	6 30	1 5	3 15	1 5	3 15	5 25	20
Total Own Per cent	39 55.7	10 14.2	10 14.8	5 7.1	7 10	1 1.4	4 5.7	9 12.8	70
Total Collected and Own Per cent	524 34.3	150 9.7	232 15	223 14.5	322 20.5	52 3.3	59 3.8	68 4.4	1531

Chart II Localization of subphrenic abscesses based upon 1531 collected cases (1 3 4 7 8 11-15) including 70 of the authors

other accountable focus can be demonstrated. If these characteristic manifestations of subphrenic infection persist instead of subsiding within a period of from a few days to a week then the development of subphrenic abscess must be considered.

In the diagnosis of subphrenic abscess the significance of the criteria of continued pyrexia and leucocytosis following known antecedent suppurative intraperitoneal process is shown by the fact that such an onset occurred in 53 (70 per cent) of our total of 75 cases. All of these cases occurred within a period of from ten days to three weeks following the antecedent lesion and were all suspected and recognized. Such an onset was also noted by McWhorter (25) in all of his cases and by Trevani (6) in 52 (81 per cent) of his 65 cases. Unfortunately there are some types with an entirely different onset. Both Barnard (37) and Whipple (47) have directed attention to this fact. They have shown that although this type forms one of the more frequent types there are still two other groups, one in which the onset is sudden and abrupt, and another with a slow insidious development. The former onset was characteristic in 10 (14 per cent) of our combined 75 cases and the latter in 12 (16 per cent). As regards this latter type of onset it is of interest to note that several observers (30-48) have remarked upon the occasional existence of subphrenic abscess in patients over long periods of time without recognition and with few or no characteristic manifestations. Both Russell (49) and Janz (26) report a case in which the conditions remained unrecognized for seven years following the initiating

lesion. It is our opinion that a subphrenic abscess almost invariably can be diagnosed correctly within a period of days or weeks.

Another important diagnostic criterion is persistent localized tenderness over the involved portion. An almost pathognomonic sign in our experience is localized tenderness over the twelfth rib indicative of infection of the right posterior superior space which is the most frequently involved region. Localized tenderness along the right or left anterior costal margin is indicative of involvement in the anterior or inferior spaces on the respective side. These two criteria that is, continued systemic manifestations of unabating infection and persistence of localized tenderness when occurring together and not subsiding under conservative therapy are of sufficient importance in our experience to warrant diagnosis and justifiable exploration.

Of further diagnostic aid is roentgenological examination. A number of observers (50-55) have stressed the significance of such characteristic signs as elevation and immobility of the diaphragm. Whereas such cardinal signs are characteristic and suggestive of subphrenic abscess it cannot be denied that other conditions may produce similar findings. It is for this reason that Pancoast (51) and Granger (53) have stressed the importance of correlating these findings with the clinical data. The undoubted usefulness of roentgenological examination is evinced by the fact that of the 63 cases in our series in which it was done 52 (82 per cent) demonstrated these findings. Unfortunately a misleading impression has been obtained that the roentgenological demon-

stration of gas with the production of a typical fluid level is one of the most reliable single guides in the diagnosis. Although such a sign is of diagnostic importance when it is present, the qualification to be recalled is that its presence is of relatively infrequent occurrence. In the experience of Elsberg (56) and Berman (57) gas was present in subphrenic abscesses in 15 per cent. Delario (33) expresses the view that this can be roentgenologically demonstrated in approximately 25 per cent of the cases. In the 23 cases of our present group of 25 in which roentgenological examination was made, there were 7 (30 per cent) with demonstrable gas.

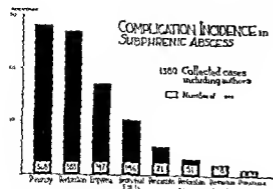
Notwithstanding a recent presentation (58) on statistical evidence of the unreliability of criteria presented with consequent diagnostic fiascos, it has been our experience that the diagnostic dependability is commensurable with the symptoms and signs of most other conditions. This is evinced by the fact that in our present group of 25 cases such criteria led to the recognition and correct diagnosis in 21 (84 per cent). None of the 4 cases not diagnosed was personally observed. Two of the 4 were admitted to the medical service and never seen by a surgeon. Both had characteristic manifestations of previous intra-abdominal inflammatory involvement, persistent localized tenderness in the involved portion, continued pyrexia, leucocytosis, and the classical roentgenological signs, but the true diagnosis was never suspected. Post-mortem examination demonstrated subphrenic abscess in both instances, with the original lesion in the gall bladder in one, and in the appendix in the other. The remaining 2 cases were treated on surgical services and similarly had the characteristic manifestations of subphrenic abscess. The autopsy in 1 revealed that the abscess had ruptured into the peritoneum, and in the other a peritonitis resulted from rupture of the abscess during exploratory operation. Although the incidence of correct diagnosis (84 per cent) in the series was relatively high, we believe, because of the characteristic manifestations in the 4 cases described above in which the diagnosis was missed, the incidence of correct diagnosis could have been and should have been 100 per cent. Whereas it is true that on the basis of these considerations there will occur mistaken diagnoses with consequent unnecessary explorations, such eventualities will not be common. Such diagnoses were made in 5 (16 per cent) of our cases (59). Moreover, there is little risk to exploration if it is performed extraserously. In the more confusing cases in which the diagnosis cannot be adequately determined, exploratory operation

is considered advisable. The expediency and propriety of this diagnostic procedure has been indicated by a number of observers (1, 4, 26, 49, 54, 58, 59, 60).

Other diagnostic aids in the differentiation of subphrenic abscesses have been suggested. Lilienthal (61) advocates the induction of pneumoperitoneum followed by a roentgenological examination in the upright position. According to this author, the absence of a transparent area above and below the liver is indicative of subphrenic abscess. In this connection Beer (62) has called attention to the works of Carelli on perirenal insufflation, in which the kidney, the adrenal glands, and the space directly under the diaphragm could be outlined. Still others have suggested exploratory aspiration. Whereas such procedures will undoubtedly corroborate the diagnosis in the instances in which pus is found, certain surgeons who have had adequate experience with this procedure contend that it is useless, irrational, and distinctly dangerous (32, 41, 43, 44, 47, 48, 54, 58, 60, 63). Heckmann and Altenburger (64) have recently advocated the injection of thorotrast into the abscess cavity in order to visualize the form and extent of the abscess. Sabshin (13) has suggested exploration by aspiration as a means of differentiating between subphrenic abscess, empyema, and pleural effusion. As emphasized in our previous publication (1), diagnostic aspirations should never be attempted, and in those cases in which the diagnosis remains doubtful, exploratory operation preferably should be undertaken.

The most frequent complications of subphrenic abscess are intrathoracic inflammatory processes and when present are of so much greater significance and with such prominent manifestations that the primary condition is usually obscured. Obviously, the incidence of these complications is directly commensurable with the length of time elapsing between the development of a subphrenic infection and the institution of therapy. Thus, a high incidence of such complications is clearly indicative of delayed diagnosis. Moreover, as will be noted later, the type of operative intervention may influence this incidence for it is not difficult to conceive the eventuality of that type of drainage which may contaminate an uninvolved serous surface.

In a series of 1,380 collected cases (1-4, 7, 8, 10, 13-25, 33) including ours, the most frequent complication was found to be pleurisy (Graph VI). This intrathoracic complication usually develops as a result of the transportation of microorganisms and toxins from the subphrenic process to



Graph VI Comparative incidence of complications in subphrenic abscess based on 1380 collected cases (1-4 7 8 10 13-25 33) including the authors

the pleura along the diaphragmatic lymphatics. Whereas some observers (12 65 66, 67) have expressed the view that an irritating pleuritis with possible serous effusion is usually an early accompaniment of a subdiaphragmatic inflammatory process it is our belief that, conversely extension to the pleura is manifestly indicative of late diagnosis. This is clearly evinced by the fact that in the personally treated cases these intrathoracic complications never occurred.

Other intrathoracic complications of graver significance are perforation of the diaphragm, empyema bronchopleural fistula and pericarditis. Their incidence in the 1380 collected cases aforementioned was 27.7 per cent, 27.8 per cent, 10.5 per cent, and 5.1 per cent, respectively (Chart III).

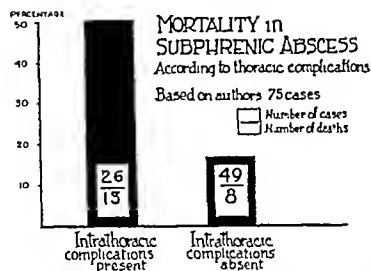
The development of these complications with such obviously high incidences is clearly significant of inadequacy of early recognition and delay in the institution of appropriate therapy. This is made even more significant by the realization that the incidence of perforation of the diaphragm and of bronchial fistula, for example, has not been materially reduced in nearly three decades. As early as 1909, Piquand (68) in an analysis of 890 collected cases of subphrenic abscess found 1.5 (19.6 per cent) with the former complication and 112 (12.5 per cent) with complicating bronchial fistulas.

Perforations of the diaphragm by a subphrenic abscess result in the development of empyema or pneumonitis and bronchial fistula, the result depending upon whether or not a free pleural space exists. If the parietal diaphragmatic pleura is not adherent to the visceral pleura at the base of the lung rupture of the diaphragm results in an empyema. On the other hand if these pleural surfaces are adherent the abscess ruptures into the lung with the development of a basilar pneumonitis and final evacuation into a bronchus which is Nature's not infrequently solicitous attempt to mitigate our lack of proficiency. However as other mechanism of lung parenchymal extension without involvement of the pleura has been suggested by the observations of Schlanger (69) and Menville and Ane (70 71, 72) These investigators were able to demonstrate roentgenologically in both animals and human beings that following the induction of lipiodol into the subphrenic abscess cavity (69), or the intra peritoneal injection

INCIDENCE OF COMPLICATIONS

	Perforation	Pleurisy	Empyema	Bronchial fistula	Pericarditis	Mediastinal Abscess	Chest infection	Pleuro-pneumonia	Pneumonia	Emphysema	Lung Abscess	No. of Cases
Previously Collected (1)	371	376	224	134	70	2	19	51	28	15	1	1302
Per cent	29	29	17.5	10	5.3	0.2	1.4	3.8	2.1	1.1	0.1	
Recently Collected (2 3 4 7 8 10 13-25 33)	10	6	14	10	1				2		6	49
Per cent	20.4	12.2	28.7	20.4	2				4		12.2	
Total Collected	381	382	238	144	71	2	19	51	30	17	7	1351
Per cent	28.2	28.2	17.6	10.6	5.2	0.2	1.4	3.7	2.2	1.3	0.5	
Previously Own (1)		5	8	1					4	2		10
Per cent		25	40	5					20	10		
Present Own	2	1	1	1			2		2			9
Per cent	22.2	12.5	12.5	12.5			22.2		22.2			
Total Own	2	6	9	2			2		6	2		29
Per cent	6.9	20.6	31	6.9			6.9		20.6	6.9		
Total Collected and Own	383	388	247	146	71	2	21	51	36	19	7	1380
Per cent	27.5	28	17.8	10.5	5.1	0.2	1.5	3.7	2.6	1.3	0.5	

Chart III Incidence of complications in subphrenic abscess occurring in 1380 collected cases (1-4 7 8 10 13 25) including the authors

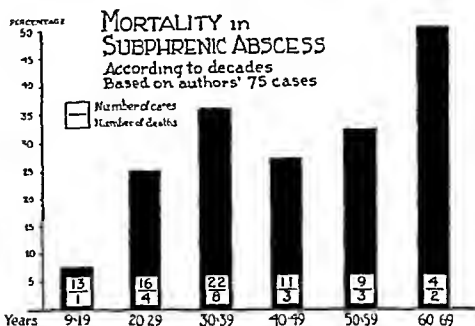


Graph VII Graphic representation of mortality in subphrenic abscess according to presence or absence of intrathoracic complications

of thorium dioxide (70-72), extension occurred to the bronchial and retrosternal lymph nodes and hilum of the lung

Aside from the uncontrollable factors of virulence of the infection and resistance of the host, the three most important factors governing the prognosis are: (1) the time elapsing between the development of the infection and the institution of therapy, (2) the presence of complications, and (3) the type of treatment employed. Obviously, as in other suppurative processes there is a commensurate increase in mortality with the delay in recognition of a condition demanding surgical intervention. Of the 5 deaths in the present group of 25 cases, delay in diagnosis was undoubtedly responsible in 3, and the type of drainage instituted in 1. The following statistics clearly exemplify the indubitable significance of intrathoracic complications as regards prognosis: approximately 42 per cent of the 31 deaths in Lockwood's (30) series followed intrathoracic complications, 5 (70 per cent) of the 7 patients who developed empyema in Gatewood's (73) series died. In a recent analysis of 125 cases of subphrenic abscess with bronchial fistula, Steele (10) found the mortality rate to be 65.6 per cent. Whereas in our combined series of 75 cases the mortality in those cases with thoracic complications was 50 per cent (13 of 26 cases), in those cases with no thoracic complications the mortality rate was 16.3 per cent (8 of 49 cases) (Graph VII). Race and sex seem to have no prognostic significance, as the mortality rate is about the same in all instances. In our combined series of 75 cases the highest mortality rate occurred in the seventh decade and the lowest in the second (Graph VIII).

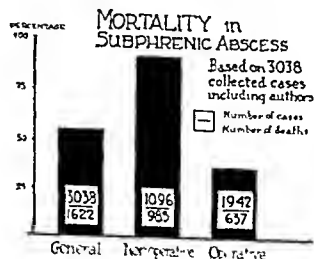
The importance of operative intervention, that is, incision and drainage in subphrenic abscess, is emphasized by the fact that, of 3,038 cases including our 75, there were 1,096 cases not oper-



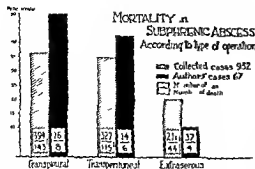
Graph VIII Mortality in subphrenic abscess according to decades in the authors' 75 cases

ated upon with 985 (89.8 per cent) deaths, as contrasted with 1,942 cases operated upon with 637 deaths (32.8 per cent). The general mortality in this collected group was 53.3 per cent (Graph IX).

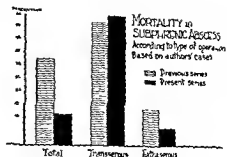
Of further significance in the prognosis of subphrenic abscess is the type of drainage employed. Obviously if an uninvolved serous cavity is in jeopardy of contamination by the type of drainage used the prognosis is much worse, not only as regards subsequent morbidity but also as regards life. Whereas of 211 collected cases of subphrenic abscess drained without contamination of the pleural or peritoneal cavities, 44 (20.8 per cent) terminated fatally, of 394 cases drained transpleurally 143 (36.2 per cent) and of 327 drained transperitoneally 115 (35.1 per cent) terminated fatally. In our combined series the corresponding mortality rates were 10.8 per cent, 50 per cent, and 42.8 per cent (Graph X). Even more significant is the fact that although the operative mortality rate in the cases operated upon in our previously reported 50 cases was 32 per cent, in the present group of 25 cases it is 11.7 per cent. This material reduction in mortality is due largely to the greater percentage of employment of extra-serous drainage procedures in the latter group.



Graph IX Mortality in subphrenic abscess based on 3,038 collected cases, including 75 of the authors'



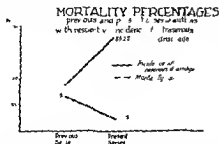
Graph X Comparative mortality rates in 952 collected cases of subphrenic abscess including the authors, according to type of operation



Graph XII Mortality in subphrenic abscess according to type of operation based on the previously reported and present authors' cases

(Graph XI) Of the 25 cases in the present group in which the type of drainage employed was extraperitoneal, there was only 1 death (6.6 per cent) (Graph XII)

Whereas the treatment of subphrenic infection is entirely surgical, it should be clearly understood that only conservative measures should be instituted as long as the process has not progressed to suppuration. The obvious rationale of this principle is based upon the fact that the majority of subphrenic infections do not progress to suppuration but subside by spontaneous resolution especially if they are recognized and conservative measures instituted. However those cases in which the characteristic clinical manifestations of subphrenic infection continue with unabated persistence for periods from a few days to a week have probably advanced to suppuration. In such instances surgical drainage must be instituted without delay. The previously mentioned statistical facts on mortality clearly establish the gravity of procrastination.



Graph XI Graphic representation of mortality rates in the authors' previously reported 50 cases of subphrenic abscess and present 25 cases as compared to the percentage of employment of extraperitoneal drainage procedures. Graph shows decrease in the mortality rate with increase in the employment of extraperitoneal drainage

It has long been a well established fact that surgical drainage is imperative in the presence of subphrenic abscess but there seems to be some controversy regarding the proper type of drainage procedure. That this controversy should still exist is rather difficult to understand, but it is obviously due to either recalcitrance or to utter disregard of rational principles and demonstrative statistical facts. Obviously the ideal type of drainage procedure is one characterized by directness, simplicity and above all avoidance of unnecessary contamination of uninvolved areas. This latter characteristic is particularly important with regard to subphrenic abscess because of the peculiar location of the subphrenic region in its proximity to two serous membranes, the pleural and the peritoneal, the marked absorbability of which is well known. It is therefore an absolute desideratum to institute that type of drainage which completely avoids the slightest possibility of contamination of the two virgin serous surfaces. Even though this surgical principle has been emphasized for over four decades (47-74-77) it is apparently not yet fully appreciated.

At present the two types of drainage procedures advocated are transthoracic and transabdominal either through a transserous or an extraserous approach. The transthoracic extraserous approach which consists of entering the subphrenic region through the diaphragm below the reflection of the pleura or by mobilization of the costophrenic angle of the pleura upward is still advocated by many surgeons. This preference is in great measure due to the peculiar anatomical character of the subdiaphragmatic region which although located within the abdomen, is so covered by the thoracic cage that ostensibly the most direct route is through the thorax. Because of this transthoracic drainage is still considered

the method of choice by some surgeons, especially those whose surgical interest lies in the chest.

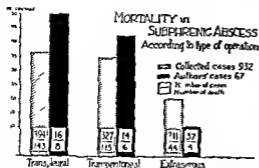
Trendelenburg (78), in 1883, first suggested the transpleural method of drainage in which avoidance of contamination of the pleural cavity is attempted by suturing the costal and diaphragmatic layers of the pleura together. A very slight modification of this old procedure has been recently described by McWhorter (25), necessitated in a case because the pleural reflection was too low. This consists of incising the costodiaphragmatic pleural reflection and then obliterating the opening into the pleural cavity by suturing the resultant edges of the diaphragmatic and costal pleurae together. Another modification of the transthoracic approach in which an attempt is made to obviate pleural contamination is the two-stage method as described by Beck (79, 80). This consists of first suturing the costophrenic pleural reflection and packing the wound for forty-eight hours with gauze impregnated with an irritative substance to produce adhesions, and at a subsequent stage incising through this area. The original statement by Boeckel (81), in 1889, that the danger of pleural contamination is avoided by the transthoracic drainage of subphrenic abscesses because the costophrenic angle is elevated above the line of incision as a result of elevation of the diaphragm, has largely contributed to the continued performance of this dangerous procedure. However, Melnikoff's excellent anatomical investigations (82, 83) have clearly demonstrated the fallacy of this conception. Even though the diaphragm may be greatly elevated, the fixation of the costophrenic reflection of the pleura to the ribs precludes the possibility of this portion of the pleura becoming elevated. Still another means of circumventing this danger was originally suggested by Parijsky (84) and consists of mobilization of the costophrenic angle upward. Whereas this procedure has been successfully employed by Melnikoff (82, 83), Whipple (47), Elkin (85), and Lilienthal (86), Brown (87) has found satisfactory mobilization of the pleura difficult because of the firm adhesions resulting from the inflammatory reaction.

Such procedures are not only unnecessary, often unwarranted, frequently difficult, and deceptively dangerous, but in many instances definitely inadequate in protecting the virgin pleural cavity against invasion. This is not only exemplified by individual reports but by overwhelming evidence of large statistical summaries. Whereas in a series of 22 cases operated upon by the transpleural method, Elsberg (56) reported a mortality of 36 per cent, in an approximately similar series

in which the retroperitoneal approach was used the mortality rate was 14 per cent. Such individually reported prominently high mortality rates as 70 per cent (5), 60 per cent (33), 43.4 per cent (88), 32 per cent (4) are in striking conformity with group statistics. Of 313 cases of subphrenic abscess collected by Flynn (89) through a questionnaire sent to 105 surgeons, 275 were treated by transpleural or transperitoneal operations with a mortality of 41 per cent. Lehman and Archer (2) have recently sounded their firm conviction of the deceptive danger of the two-stage transthoracic approach as a result of a fatality "from massive perforation of the abscess into the pleura above the packed area before the second stage was reached." This constantly present danger is further demonstrated in our own series of 75 cases. There were 16 cases in this group drained transpleurally with a mortality rate of 50 per cent. A fatal empyema resulted in the only 2 cases in this group in which suture of the costal and phrenic layers of the pleura was recorded. Of still greater significance are the mortality figures in a large series of collected cases from the literature. Of 932 collected cases, 394 had transpleural drainage with a mortality of 36.2 per cent as contrasted with a mortality of 20.8 per cent in 211 collected cases with extraperitoneal drainage (Graph IX). This lamentable mortality of 36.2 per cent in transpleural drainage is, to state it mildly, highly suggestive of its deficiency and inadvisability as the operative mortality rate almost thirty years ago was even 10 per cent less (90).

The transperitoneal method of approach is similarly disadvantageous in that it permits contamination of uninvolved portions of the peritoneum. Of 327 collected cases in which the transperitoneal method of drainage was employed 115 terminated fatally (35.1 per cent). Of the 14 cases in our series drained by this method 6 terminated fatally (42.8 per cent) (Graph IX). There were 9 cases in this group drained through limiting adhesions with 1 death (11.1 per cent) and 5 cases drained through the uninvolved peritoneum with fatal termination in all.

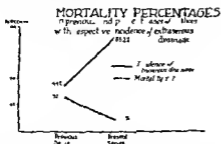
On the basis of surgical rationale and with the corroboration of the self-evident results of the statistical analysis of the collected cases, it becomes increasingly obvious that adequate evacuation of subphrenic abscesses should be performed in such a manner that contamination of the pleural and peritoneal cavities is completely avoided. These important principles were thoroughly appreciated long ago (37, 74-77, 91), and their complete disregard in the face of overwhelming



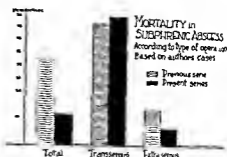
Graph X. Comparative mortality rates in 999 collected cases of subphrenic abscess, including the authors' according to type of operation

(Graph XI) Of the 15 cases in the present group in which the type of drainage employed was extraperitoneal, there was only 1 death (6.6 per cent) (Graph XII)

Whereas the treatment of subphrenic infection is entirely surgical, it should be clearly understood that only conservative measures should be instituted as long as the process has not progressed to suppuration. The obvious rationale of this principle is based upon the fact that the majority of subphrenic infections do not progress to suppuration but subside by spontaneous resolution, especially if they are recognized and conservative measures instituted. However, those cases in which the characteristic clinical manifestations of subphrenic infection continue with unabated persistence for periods from a few days to a week, have probably advanced to suppuration. In such instances, surgical drainage must be instituted without delay. The previously mentioned statistical facts on mortality clearly establish the gravity of procrastination.



Graph XI. Graphic representation of mortality rates in the authors' previously reported 50 cases of subphrenic abscess and present 25 cases as compared to the percentage of employment of extraperitoneal drainage procedures. Graph shows decrease in the mortality rate with increase in the employment of extraperitoneal drainage



Graph XII. Mortality in subphrenic abscess according to type of operation based on the previously reported and present authors' cases

It has long been a well established fact that surgical drainage is imperative in the presence of subphrenic abscess but there seems to be some controversy regarding the proper type of drainage procedure. That this controversy should still exist is rather difficult to understand but it is obviously due to either recalcitrance or to utter disregard of rational principles and demonstrative statistical facts. Obviously the ideal type of drainage procedure is one characterized by directness, simplicity, and above all, avoidance of unnecessary contamination of uninvolved areas. This latter characteristic is particularly important with regard to subphrenic abscess because of the peculiar location of the subphrenic region, i.e., its proximity to two serous membranes the pleural and the peritoneal, the marked absorbability of which is well known. It is therefore an absolute desideratum to institute that type of drainage which completely avoids the slightest possibility of contamination of these two virgin serous surfaces. Even though this surgical principle has been emphasized for over four decades (37, 74-77) it is apparently not yet fully appreciated.

At present the two types of drainage procedures advocated are transthoracic and transabdominal either through a transserous or an extraperitoneal approach. The transthoracic extraperitoneal approach which consists of entering the subphrenic region through the diaphragm below the reflection of the pleura or by mobilization of the costophrenic angle of the pleura upward is still advocated by many surgeons. This preference is a great measure due to the peculiar anatomical character of the subdiaphragmatic region which although located within the abdomen is so covered by the thoracic cage that ostomy is the most direct route is through the thorax. Because of this transthoracic drainage is still considered

the method of choice by some surgeons, especially those whose surgical interest lies in the chest

Trendelenburg (78), in 1883, first suggested the transpleural method of drainage in which avoidance of contamination of the pleural cavity is attempted by suturing the costal and diaphragmatic layers of the pleura together. A very slight modification of this old procedure has been recently described by McWhorter (25), necessitated in a case because the pleural reflection was too low. This consists of incising the costodiaphragmatic pleural reflection and then obliterating the opening into the pleural cavity by suturing the resultant edges of the diaphragmatic and costal pleurae together. Another modification of the transthoracic approach in which an attempt is made to obviate pleural contamination is the two-stage method as described by Beck (79, 80). This consists of first suturing the costophrenic pleural reflection and packing the wound for forty-eight hours with gauze impregnated with an irritative substance to produce adhesions, and at a subsequent stage incising through this area. The original statement by Boeckel (81), in 1889, that the danger of pleural contamination is avoided by the transthoracic drainage of subphrenic abscesses because the costophrenic angle is elevated above the line of incision as a result of elevation of the diaphragm, has largely contributed to the continued performance of this dangerous procedure. However, Melnikoff's excellent anatomical investigations (82, 83) have clearly demonstrated the fallacy of this conception. Even though the diaphragm may be greatly elevated, the fixation of the costophrenic reflection of the pleura to the ribs precludes the possibility of this portion of the pleura becoming elevated. Still another means of circumventing this danger was originally suggested by Parijsky (84) and consists of mobilization of the costophrenic angle upward. Whereas this procedure has been successfully employed by Melnikoff (82, 83), Whipple (47), Elkin (85), and Lilienthal (86), Brown (87) has found satisfactory mobilization of the pleura difficult because of the firm adhesions resulting from the inflammatory reaction.

Such procedures are not only unnecessary, often unwarranted, frequently difficult, and deceptively dangerous, but in many instances definitely inadequate in protecting the virgin pleural cavity against invasion. This is not only exemplified by individual reports but by overwhelming evidence of large statistical summaries. Whereas in a series of 22 cases operated upon by the transpleural method, Elsberg (56) reported a mortality of 36 per cent, in an approximately similar series

in which the retroperitoneal approach was used the mortality rate was 14 per cent. Such individually reported prominently high mortality rates as 70 per cent (5), 60 per cent (33), 43.4 per cent (88), 32 per cent (4) are in striking conformity with group statistics. Of 313 cases of subphrenic abscess collected by Flynn (89) through a questionnaire sent to 105 surgeons, 275 were treated by transpleural or transperitoneal operations with a mortality of 41 per cent. Lehman and Archer (2) have recently sounded their firm conviction of the deceptive danger of the two-stage transthoracic approach as a result of a fatality "from massive perforation of the abscess into the pleura above the packed area before the second stage was reached." This constantly present danger is further demonstrated in our own series of 75 cases. There were 16 cases in this group drained transpleurally with a mortality rate of 50 per cent. A fatal empyema resulted in the only 2 cases in this group in which suture of the costal and phrenic layers of the pleura was recorded. Of still greater significance are the mortality figures in a large series of collected cases from the literature. Of 932 collected cases, 394 had transpleural drainage with a mortality of 36.2 per cent as contrasted with a mortality of 20.8 per cent in 211 collected cases with extra-serous drainage (Graph IX). This lamentable mortality of 36.2 per cent in transpleural drainage is, to state it mildly, highly suggestive of its deficiency and inadvisability as the operative mortality rate almost thirty years ago was even 10 per cent less (90).

The transperitoneal method of approach is similarly disadvantageous in that it permits contamination of uninvolved portions of the peritoneum. Of 327 collected cases in which the transperitoneal method of drainage was employed 115 terminated fatally (35.1 per cent). Of the 14 cases in our series drained by this method 6 terminated fatally (42.8 per cent) (Graph IX). There were 9 cases in this group drained through limiting adhesions with 1 death (11.1 per cent) and 5 cases drained through the uninvolved peritoneum with fatal termination in all.

On the basis of surgical rationale and with the corroboration of the self-evident results of the statistical analysis of the collected cases, it becomes increasingly obvious that adequate evacuation of subphrenic abscesses should be performed in such a manner that contamination of the pleural and peritoneal cavities is completely avoided. These important principles were thoroughly appreciated long ago (37, 74-77, 91), and their complete disregard in the face of overwhelming

statistical evidence and cumulative attestation is indicative of bigoted contumacy or hazardous casuistry.

Subphrenic abscesses can readily be drained without fear of contaminating either the pleural or peritoneal cavities by an extraperitoneal anterior or posterior approach, depending upon the location. Those abscesses situated in the right anterior inferior, the right anterior superior, the left anterior inferior, and the left superior spaces can be drained with assurable avoidance of pleural or peritoneal contamination by utilizing the approach described by Clairmont (92). The skin incision is made anteriorly just beneath and parallel to the costal margin. The oblique muscles and transversalis fascia are traversed until the anterior parietal peritoneum is reached. By careful mobilization of the parietal peritoneum from the lower surface of the diaphragm the abscess cavity can be entered through the adhesions which wall it off from the peritoneal cavity. Soft rubber tissue drains are introduced through the wound into the abscess cavity.

Abscesses located in the right posterior superior space with or without associated abscess in the right inferior space can be drained with greater facility and most rationally by the retroperitoneal approach previously described (1, 32, 42, 43, 44). Briefly the procedure consists of making the skin incision immediately over the twelfth rib subperiosteally resecting this rib and making a transverse incision through its bed at the level of the spinous process of the first lumbar vertebra. Melnikoff demonstrated (83) in his extensive anatomical investigations that the relation of the costophrenic angle of the pleura to the twelfth rib varies considerably in different individuals but the angle never extends below the level of the spinous process of the first lumbar vertebra. Thus the importance of making the transverse incision at the level of the spinous process of the first lumbar vertebra becomes obvious. This incision permits entrance into the peritoneal space between the upper pole of the kidney and the inferior surface of the liver. If the abscess is situated in the right posterior superior space, mobilization of the parietal peritoneum from the under surface of the diaphragm is readily effected by the gloved finger and the abscess may be approached completely extraperitoneally. The abscess cavity is opened by plunging the finger through the pyogenic wall.

The results obtained by this method of drainage conspicuously show the advisability of its use. Of 211 collected cases in which the retroperitoneal method of drainage was employed there

were 44 deaths (20.8 per cent) as contrasted to the respective mortality rates of 36.2 per cent and 35.1 per cent in 394 collected cases drained transpleurally and 327 cases drained transperitoneally (Graph IX). Of our combined series of 73 cases there were 37 drained by this retroperitoneal method with 4 deaths (10.8 per cent). Still more significant is the fact that in the present series of 25 cases there were 15 drained "retroperitoneally" with only 1 death (6.6 per cent) (Graph X). These contrasting operative mortality figures emphasize the advantages of the retroperitoneal method of drainage in subphrenic abscess.

SUMMARY

1. An analysis of 3,583 cases of subphrenic abscess collected from the world literature and a presentation of 25 additional cases is made.

2. The sex incidence of subphrenic abscess reveals a preponderance of occurrence in the male which is probably due to a correspondingly greater incidence of the original lesion in the male. There is no significant racial predisposition. The greatest incidence with regard to age occurs in from the third to the fifth decades, inclusive.

3. Whereas the incidence of subphrenic abscess is not high, subphrenic infections occur much more frequently than is commonly supposed, but fortunately do not progress to suppuration.

4. Subphrenic abscess is primarily a complication of an intra-abdominal suppurative process. Over half of all subphrenic abscesses are the result of suppurative lesions of the appendix and perforative lesions of the stomach and duodenum.

5. The micro-organisms most frequently obtained from subphrenic abscesses are the colon bacillus, streptococcus and staphylococcus.

6. The routes of extension of infection to the subphrenic spaces are rarely through vascular channels from neighboring or distant foci, but most frequently through intraperitoneal or extraperitoneal direct invasion or lymphatic drainage.

7. The most frequently involved subphrenic space is the right posterior superior (33.7 per cent of the collected cases and 55 per cent of the authors).

8. Whereas the inaccessibility of the subphrenic region lends considerably to the difficulty in diagnosis, the frequent omission of and delay in the diagnosis are due in great measure to the failure to suspect its presence. The possibility of subphrenic infection always must be strongly suspected in every patient with continued pyrexia and leucocytosis who has had an antecedent suppurative intraperitoneal process and in whom no other accountable focus can be demonstrated. If

these manifestations of infection persist instead of subsiding within a period of a few days to a week, and particularly if there is persistent localized tenderness over the involved portion or over the twelfth rib and roentgenological demonstration of elevation and immobility of the diaphragm, the diagnosis of subphrenic abscess is justified and exploratory operation warranted.

9. The most frequent complications of subphrenic abscess are intrathoracic inflammatory processes which are the direct result of delay in diagnosis and the institution of appropriate therapy. The gravity of these complications is shown by the fact that in our combined series of 75 cases the mortality of those cases with thoracic complications was 50 per cent in contrast to 16.3 per cent in those cases with no thoracic complications.

10. Aside from the uncontrollable factors of virulence of the infection and resistance of the host, the three most important factors governing the prognosis are: (1) the time elapsing between the development of the infection and the institution of therapy; (2) the presence of complications, and (3) the type of treatment employed.

11. Whereas the treatment of subphrenic infection is conservative, the treatment of subphrenic abscess is surgical drainage. Of 3,038 cases including 75 of the authors' there were 1,096 cases treated non-operatively with 985 (89.8 per cent) deaths as contrasted to 1,942 cases treated by operation with 637 (32.8 per cent) deaths.

12. The employment of that type of drainage which completely avoids the slightest possibility of contamination of the peritoneal or pleural cavities is of paramount importance. Of 932 collected cases, 394 had transpleural drainage with a mortality of 36.2 per cent and 327 had transperitoneal drainage with a mortality of 35.1 per cent, while in the remaining 211 cases with extra-serous drainage there was a mortality of 20.8 per cent. In our combined series the corresponding mortality rates were 50 per cent, 42.8 per cent, and 10.8 per cent.

13. Whereas in our previously reported 50 cases the operative mortality rate was 32 per cent, in the present group of 25 cases it is 11.7 per cent. This material reduction in mortality is largely due to the greater percentage of employment of extra-serous drainage procedures in the latter group.

14. In the 15 cases of the present group in which the type of drainage employed was extra-serous, there was only 1 death (6.6 per cent).

15. The technique of the "retroperitoneal" operation is described. The results obtained by this method of drainage conspicuously show the advisability of its use and its advantages.

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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Parsons, W. B.: Silk Sutures in the Repair of Hernia. *Ann Surg*, 1937, 106 343

Operative technique in the repair of hernia, as formulated by Halsted and others, involves the slightest possible contamination of the wound, the minimal amount of trauma to the tissues, and the use of the least irritating suture material

Meleney's report, based on nine years' study with considerable data on the use of both catgut and silk in wounds, showed a marked superiority in the healing of the wounds in which silk had been employed, as compared with those in which catgut had been used. The follow-up results show fewer recurrences of hernia when silk was used for repair than when catgut was used

It is reasonable to assume that silk technique, rigidly followed, is the method of choice in the operation for repair of hernia ELLA M. SALMONSEN

GASTRO-INTESTINAL TRACT

Schindler, R., and Giere, N.: Gastric Surgery and Gastroscopy: Differential Diagnosis of Benign and Malignant Lesions; Operability of Tumors as Determined by Gastroscopy, Early Diagnosis of Gastric Carcinoma; the Postoperative Stomach. *Arch Surg*, 1937, 35 712

The purpose of this article is to show the usefulness and value of gastroscopy to the surgeon. The following questions are discussed: Is a lesion of the stomach, which has been diagnosed by other methods, a benign ulcer or a carcinoma? Is cancer of the stomach operable? Of what value is gastroscopy in the early diagnosis of carcinoma, and may it improve the operative results? What are the reasons for the abdominal distress which so frequently follows operations for gastric lesions?

The article is based on the findings of 78 gastroscopic examinations carried out on 41 patients. Thirteen of the 41 patients underwent gastroscopy preceding operation, and 2 of the 13 patients, again after operation. The remaining 28 patients were all examined postoperatively, 7 patients of this group again underwent operation after gastroscopy, and offered the opportunity for a biopsy control in 20 cases

Although the gastroscopic diagnosis was confirmed in every one of the 20 cases in which a biopsy control was possible, it must nevertheless be admitted that negative findings in gastroscopy are not entirely conclusive.

The differential diagnosis between benign and malignant ulceration is not difficult after a gastroscopic examination by one trained in this field, even in the very early stage biopsy is not necessary. The differentiation between benign and malignant ob-

struction is more difficult but also possible. Gastroscopic diagnosis was proved to be correct in each of 7 cases. The gastroscopic picture is more characteristic than that of the gross specimen because of the presence of the circulating blood

The operability of carcinoma was best determined by gastroscopy in 9 cases.

Special attention is called to the fact that operation for gastric carcinoma frequently results in a cure of long duration, particularly in cases in which the diagnosis is made early. Early gastroscopy together with an early roentgenogram is capable of revealing operable carcinoma. Gastroscopy has proved to be superior to roentgen examination in certain cases; theoretically, roentgen examination should be superior in other cases. The two methods are not competitors; each supplements the other, and good cooperation between the gastroscopist and the roentgenologist is essential

An unfavorable, diffusely infiltrating carcinoma of the body of the stomach should be recognized by gastroscopy and excluded from operation. Exploratory laparotomy should be done only in those relatively few cases in which the operability of the lesion is not definitely determined by gastroscopic examination. This will result in a greatly lowered surgical mortality and will help to dispel the prejudice which so many hold in respect to the surgical treatment of carcinoma

The artificial stoma was seen with the flexible gastroscope in 12 cases after resection and in 15 cases after gastro-enterostomy; it was not revealed in only 3 cases in which gastro-enterostomy had been done, or 10 per cent of all the cases seen after operation. The finding of the stoma, however, is not easy; the correct instrument must be chosen in respect to the peculiarities of the individual case. A relatively normal stomach was seen in only 3 instances (10 per cent). Recurrent ulcer was found in 1 case and a jejunal ulcer in 2 cases; the ulcer was probably missed in 1 case. Simple hemorrhagic erosions were observed twice. Silk sutures which had cut through the mucous membrane and were hanging free into the gastric cavity were observed in 3 cases. The most frequent disease of the stomach after operation was chronic gastritis; it was observed in 15 cases. Gastroscopic examination was unsatisfactory in 4 cases. An artificial stoma after resection or gastro-enterostomy may remain patent or may acquire pylorus-like rhythmic activity. Four stomas of the latter type were seen: 2 after resection and 2 after gastro-enterostomy. It seems quite certain that this pylorus-like adaptation protects the stomach against the development of postoperative gastritis. Although we do not know what conditions favor this development after resection, it does seem that gastro-enterostomies which are carried out in the posterior wall near the pylorus and close to the

greater curvature have a greater tendency to bring about this adaptation. Silk sutures which have not been expelled into the cavity of the stomach several months after operation should be surgically removed since they irritate the mucous membrane and cause chronic gastritis with painful erosions, and may even play a part in the development of jejunal ulcers. High voltage roentgen therapy by the Coutard method causes severe gastritis in the stomach after operation just as it does in other mucous membranes.

JOSEPH K. NARAT, M.D.

Finney J. M. T. Jr. Pyloroplasty and Gastro-duodenostomy. *Surgery* 1917, 2: 738

In 1881 Billroth performed the first successful resection of a pyloric tumor in man and in so doing gave to surgery what is known as the Billroth Type I pylorotomy and anastomosis. The author believes that some form of anatomical restoration of relationships when possible is most desirable and offers better functional results and prognosis than any of the methods involving a new anatomical arrangement.

The acid secreting glands are situated in the fundus of the stomach not at the pyloric end. One of the arguments widely employed to favor a resection of the pyloric end of the stomach over some form of plastic operation on the pylorus is that by so doing one removes a large part of the acid forming area and thereby helps to control any tendency toward hyperacidity. This is not true unless an extensive resection is done. On the contrary the glands in the pyloric portion of the stomach are apparently the same as or similar to Brunner's glands in the duodenum and their secretion is alkaline.

In the mechanical correction of pylorospasm the sphincter muscle must be put completely out of function. When one considers that the duodenum is accustomed and acclimated to the reception of the acid contents of the stomach as they are expelled through the pylorus it would appear reasonable that normal anatomical relationships should be maintained in our choice of operations when possible. The most potent bar to the employment of a pyloroplasty or gastroduodenostomy is the presence of dense scar tissue and adhesions binding the pylorus and the duodenal cap superiorly to the liver and posteriorly to the common duct, hepatic vessels and the head of the pancreas. This may render the proper mobilization of the duodenum and pylorus impossible. It cannot be too strongly emphasized that the successful result of pyloroplasty or gastroduodenostomy is directly dependent upon the complete mobility of the duodenum.

Operations consisting of simple division of the pyloric sphincter are termed pyloroplasties. Excision or total removal of the pyloric sphincter is the method of procedure in gastroduodenostomy. The Fredet-Rammstedt submucous pyloroplasty for congenital pyloric stenosis is well known. The first plastic operation on the pylorus was reported from Heineke's clinic in 1886. The same operation was



reported one year later by Mikulicz. This is the pioneer of all plastic operations on the pylorus. The Mayo modification consists of a somewhat longer and a crescentic rather than a linear incision which makes the excision of a possible ulcer a simple matter.

In 1902 Finney described his pyloroplasty. The abdomen is opened by a high right rectus incision curved medially at the upper end along the costal margin if necessary to gain proper exposure. Careful examination is next made of the local lesion to determine the suitability of the condition for operation by this method. The superior margin of the duodenum just beyond the pylorus is freed from any adhesions and from the supporting ligament running to the under surface of the liver. This is done by an incision along the duodenal margin followed by the blunt peeling-out of the duodenum with the fingers. In this manner practically the entire first and second portion of the duodenum may be readily mobilized. Next three guide or tractor sutures are placed: one at the upper margin of the pylorus, one in the wall of the stomach close to the greater curvature and the third along the free border of the duodenum and 3 in. distal to the pylorus. By traction on the last two guides downward and at the same time traction on the upper guide the walls of the stomach and duodenum virtually fall in apposition for the placing of the posterior suture. This is of fine black silk or catgut if preferred. It is most easily placed with a fine curved needle. The first line posterior suture employed is a simple continuous one beginning at the lower border of the pylorus and running downward to the traction sutures inserted well back toward the vessels of the greater curvature of the stomach and the vessels of the mesentery of the duodenum. A second layer of mattress sutures of fine silk is next placed far enough out from the posterior row so as to include any ulcer which may be situated on the anterior or upper portion of the duodenum and allow of its excision later. These mattress sutures are next loosened and retracted one half downward the other half upward and thus held well out of the operative field. The general abdominal cavity is now packed off from the region of operation and the wound edges protected by wet pads before the incisions into the stomach and bowel are made. Beginning from below on the stomach side about $\frac{1}{2}$ in. from the lower end of the pos-

terior suture line and carefully including all layers of the stomach wall, the incision should be carried upward and through the pylorus down into the duodenum, in the shape of a narrow inverted U, to a point opposite the start on the stomach side. This procedure gives approximately a $2\frac{1}{2}$ in incision in the anterior wall of each viscus connected by a division of the pyloric sphincter. If there is an ulcer of the anterior or superior portion of the pylorus or duodenum, it should be excised. The bleeding points of the anterior wall of both the stomach and duodenum should be clamped and tied individually. There may be a redundancy of tissue at the upper end of the posterior suture line where the pyloric sphincter has been cut across. If this seems excessive, it may be trimmed off. It has been found, however, that this ridge of tissue will flatten out and disappear if left alone.

At this stage of the operation we have a posterior wall held solidly by a continuous serous suture of silk and a second-row muscular and mucosal continuous suture of catgut. Next, the mattress sutures previously laid in the anterior wall are drawn taut and tied. This row is reinforced by a second one of Lembert sutures of fine silk, which complete the anastomosis. The abdominal wound is closed in layers without drainage.

The first successful resection of the pylorus (gastroduodenostomy) was performed by Billroth in 1881. In the technique of pylorotomy, the writer follows closely the principles laid down by W J Mayo. The success of the procedure depends on early ligation of the gastric artery as close as necessary to the celiac axis, which in turn is dependent upon the location of the growth in the stomach and also upon the amount of stomach that is to be removed.

What are the advantages of the various pyloroplasties and gastroduodenostomies? First, they admit of thorough examination of the lesion and the lining of both the stomach and bowel, and local removal of the lesion when necessary. Second, when a perforated ulcer near the pylorus is found, some form of pyloroplasty is usually applicable and again allows of excision of the ulcer. Third, a pyloroplasty or gastroduodenostomy without resection enlarges the opening of the stomach into the duodenum, and divides the sphincter and destroys its function, thus allowing free transfer back and forth of acid gastric and alkaline duodenal secretions to effect neutralization of each other. Fourth, pyloroplasty does not remove the ulcer-bearing area, only pylorotomy does this. Fifth, pyloroplasty does not decrease the acid-bearing area of the stomach, neither does simple gastrojejunostomy do so; only a very extensive resection of the stomach will accomplish this. Sixth, pyloroplasty is claimed by some to be technically more difficult than gastroenterostomy, but this is debatable. If the principles of mobilization of the duodenum are thoroughly understood and carried out, the field of applicability will be found quite wide.

In conclusion, the writer states that he is prejudiced in favor of pyloroplasty and gastroduodenostomy, but not unreasonably so.

JOHN W. NUZUM, M D

Groenberger, G.: Chronic Invagination of the Intestine in Children (*Chronische Darminvagination bei Kindern*). *Svensk Lakartidn.*, 1937, p. 524.

The author begins with a comprehensive discussion of early diagnosis, treatment, and course of invagination of the intestine. The fact that the number of cases of acute invagination of the intestine is higher in England, the United States, and Denmark than in other countries is due to a general misuse of purgative remedies in the first mentioned countries.

The sooner the invagination is diagnosed, the sooner treatment can begin, always with an attempt at bloodless disinvagination, first, and then laparotomy. The advantages of reduction with barium sulphate with the aid of the roentgen rays are known; the disadvantages consist in the facts that precious time is being lost before the patient is taken to the hospital, and that not in every hospital is the roentgen-ray department at the disposal of the patient at any time, day or night. Consequently, the use of sodium-chloride enemas is becoming more and more popular, and the results after prompt diagnosis show a successful outcome in 50 per cent of the cases. In cases of sucking babies, the condition must not remain unattended longer than sixteen hours, moreover, experience teaches that in the case of babies intestinal changes which would preclude every attempt at a bloodless invagination are found already after twelve hours. As soon as such a diagnosis is apparent, or if it cannot be excluded with certainty, one should operate. Satisfactory results can be expected in 95 per cent of the cases if the operation is performed within twenty-four hours after the attack.

The author next presents a complete history with roentgenograms of a three-year-old boy, suffering from chronic invagination. There was a gradual loss of appetite, and finally the patient experienced spasmodic convulsions with pains in the left epigastrium. Three medical examinations resulted in three different diagnoses with corresponding treatment, but without any success. Finally, the patient was hospitalized and given a roentgen-ray examination and a barium sulphate meal. There was a clear demonstration of an invagination starting at the cecum, the invaginated distal pole lay next to the hepatic flexure. On account of the forceful action of the peristalsis of the small intestine, the barium sulphate meal passed through the invaginated intestinal lumen and separated it, stretching it about a finger's breadth. There was a characteristic shell-like filling defect. There were colic pains along with the passage. A diagnosis of irreducible invagination of the cecum with difficult but possible intestinal passage was made. Reposition of the invaginated loop of the small intestine at operation was comparatively easy, but disinvagination of the ascending colon and

greater curvature have a greater tendency to bring about this adaptation. Silk sutures which have not been expelled into the cavity of the stomach several months after operation should be surgically removed since they irritate the mucous membrane and cause chronic gastritis with painful erosions and may even play a part in the development of jejunal ulcers. High voltage roentgen therapy by the Coulaud method causes severe gastritis in the stomach after operation just as it does in other mucous membranes.

JOSEPH K. NARAT, M.D.

Finney, J. M. T. Jr. Pyloroplasty and Gastro duodenostomy. *Surgery* 1937 2 738

In 1881, Billroth performed the first successful resection of a pyloric tumor in man and in so doing gave to surgery what is known as the Billroth Type I pyloroplasty and anastomosis. The author believes that some form of anatomical restoration of relationships, when possible, is most desirable and offers better functional results and prognosis than any of the methods involving a new anatomical arrangement.

The acid secreting glands are situated in the fundus of the stomach, not at the pyloric end. One of the arguments widely employed to favor a resection of the pyloric end of the stomach over some form of plastic operation on the pylorus is that by so doing one removes a large part of the acid forming area and thereby helps to control any tendency toward hyperacidity. This is not true unless an extensive resection is done. On the contrary, the glands in the pyloric portion of the stomach are apparently the same as or similar to Brunner's glands in the duodenum and their secretion is alkaline.

In the mechanical correction of pylorospasm the sphincter muscle must be put completely out of function. When one considers that the duodenum is accustomed and acclimated to the reception of the acid contents of the stomach as they are expelled through the pylorus, it would appear reasonable that normal anatomical relationships should be maintained in our choice of operations when possible. The most potent bar to the employment of a pyloroplasty or gastroduodenostomy is the presence of dense scar tissue and adhesions binding the pylorus and the duodenal cap superiorly to the liver and posteriorly to the common duct, hepatic vessels and the head of the pancreas. This may render the proper mobilization of the duodenum and pylorus impossible. It cannot be too strongly emphasized that the successful result of pyloroplasty or duodenostomy is directly dependent upon the complete mobility of the duodenum.

Operations consisting of simple division of the pyloric sphincter are termed pyloroplasties. Exclusion or total removal of the pyloric sphincter is the method of procedure in gastroduodenostomy. The Fredet-Rammstedt submucous pyloroplasty for congenital pyloric stenosis is well known. The first plastic operation on the pylorus was reported from Heineke's clinic in 1886. The same operation was



reported one year later by Mikulicz. This is the pioneer of all plastic operations on the pylorus. The Mayo modification consists of a somewhat longer and a crescentic rather than a linear incision which makes the excision of a possible ulcer a simple matter.

In 1902 Finney described his pyloroplasty. The abdomen is opened by a high right rectus incision curved medially at the upper end along the costal margin if necessary, to gain proper exposure. Careful examination is next made of the local lesion to determine the suitability of the condition for operation by this method. The superior margin of the duodenum just beyond the pylorus is freed from any adhesions and from the supporting ligament running to the under surface of the liver. This is done by an incision along the duodenal margin followed by the blunt peeling-out of the duodenum with the fingers. In this manner practically the entire first and second portion of the duodenum may be readily mobilized. Next three guide or tractor sutures are placed, one at the upper margin of the pylorus, one in the wall of the stomach close to the gastrocolic omentum 3 in. from the pylorus on the greater curvature and the third along the free border of the duodenum and 3 in. distal to the pylorus. By traction on the last two guides downward and at the same time traction on the upper guide, the walls of the stomach and duodenum virtually fall in apposition for the placing of the posterior suture. This is of fine black silk or catgut if preferred. It is most easily placed with a fine curved needle. The first line posterior suture employed is a simple continuous one beginning at the lower border of the pylorus and running downward to the traction suture inserted well back toward the vessels of the greater curvature of the stomach and the vessels of the mesentery of the duodenum. A second layer of mattress sutures of fine silk is next placed far enough out from the posterior row so as to include any ulcer which may be situated on the anterior or upper portion of the duodenum and allow of its excision later. These mattress sutures are next loosened and retracted one half downward, the other half upward and thus held well out of the operative field. The general abdominal cavity is now packed off from the region of operation and the wound edges protected by wet pads before the incisions into the stomach and bowel are made. Beginning from below on the stomach side about 3/4 cm. from the lower end of the pos-

mately the same as for carcinoma in other regions. The case reports indicate a predominance of males of a 2:1 ratio.

The pathology is usually that of an annular adenocarcinoma, although other types of pathology, such as malignant degeneration of polyps, malignant transformation of pancreatic rests, colloid carcinoma, and expansile ulcerated and non-ulcerated lesions, have been described. The annular lesions are almost invariably constrictive. According to the more recent authors, metastases are frequently found rather early, although in the past it was believed that this type of carcinoma metastasized rather late. The metastases occur first in the local lymph glands, then in the liver, long bones, lungs, ovary, and dura.

The symptoms of the disease depend largely on the speed of development of mechanical bowel obstruction by the tumor mass, rather than on cachexia from the tumor itself. In the slowly growing tumors, there is often a period of from three months to a year or more in which the patient complains only of indefinite abdominal distress, which is unrelated to meals, unaffected by food or alkalies, and accompanied by occasional nausea and vomiting. Loss of weight, appetite, and strength are quite common. A change in bowel habits with the appearance of diarrhea or constipation, and bloody or tarry stools is also common. Abdominal distention and flatulence are sometimes reported. The acute symptoms, which are sometimes all that the patient ever has, but more often follow a period of indefinite complaints, are ushered in with increasingly frequent and persistent vomiting, cramping abdominal pains that become localized, marked loss of weight, abdominal distention, and constipation, or occasionally a bloody diarrhea.

The physical findings in the acute stage are usually those of dehydration, some emaciation, abdominal distention, visible peristalsis, and occasionally a palpable tumor mass. The laboratory findings often indicate a secondary anemia, a depletion of free hydrochloric acid to complete achlorhydria, evidence of dehydration, and the presence of blood in the stool. The x-ray findings are those of incomplete or complete obstruction of the small bowel.

The treatment is surgical when the diagnosis has been established. Resection of the tumor mass with anastomosis of the adjoining portions of the bowel is given as the method of choice. In those cases in which resection cannot be carried out, some form of palliative operation for relief of the obstruction is often performed. The prognosis is not good in any event.

JOSEPH K. NARAT, M.D.

Dixon, C. F., and Weber, H. M.: *The Diagnosis and Surgical Treatment of Perforating Lesions of the Colon*. Surgery, 1937, 2: 411.

THE ROENTGENOLOGICAL DIAGNOSIS

The treatment and prognosis in tumefactive lesions of the large intestine are conditioned primarily

on whether they are of neoplastic or of non-neoplastic nature. The lesions of the rectum and lower sigmoid within reach of the proctoscope are left out of consideration here for the reason that no less direct diagnostic method could conceivably be more accurate and reliable than the competently performed proctoscopic examination in the diagnosis of these lesions.

It may be affirmed that the roentgenological examination can be made to reveal the presence of any tumefactive lesion of the large intestine, at least as early in its development as it is able to manifest itself by clinical signs and symptoms. Such lesions are exhibited roentgenologically by producing what is called a filling defect, which may be defined as a constant, persistent subtraction from the normal contour.

Carcinoma of the large intestine is manifested roentgenologically by signs so consistently distinctive that they are considered to be only slightly less pathognomonic than the gross morphological picture itself.

The typical neoplastic filling defect is always confined to a relatively short intestinal segment, and describes a more or less marked, but relatively pervious narrowing of the lumen.

Different histological and gross morphological types of carcinoma present different intraluminal relief patterns, but the normal relief is always entirely obliterated. Polypoid carcinoma produces a marginal filling defect only when ulcerated, in which case the relief pattern reflects its saucer-like form, but again the granular amorphous character of the surface is apparent, broken irregularly by elevations corresponding to the excrescences of carcinomatous substance on the surface. Invariably apparent, however, and the most telltale feature of the neoplastic relief pattern, is the abruptness with which it is delimited from the uninvolved mucosa proximally and distally contiguous to it.

The typical non-neoplastic filling defect is best defined as one in which the pathognomonic evidences of true neoplasm are lacking. It is essentially a constriction of the lumen, embracing only a part of one of the divisions of the large intestine, but it usually is a longer defect than the one associated with neoplasm. Inflammatory disease in general is progressive and to a certain extent self-limited, and the gross morphological as well as roentgenological appearances depend largely on the stage of development at which the lesion is observed.

The tuberculous, amebic, and the streptococcic granulomas are the principal examples of this group of inflammatory tumefactions. Combined involvement of the ileum and cecum is commonly seen when an inflammatory tumor involves this region, a phenomenon never seen with neoplasm unless perforation has taken place. All of these morphological features are reflected faithfully in the roentgenological picture.

When the roentgenological examination has demonstrated that a tumefactive lesion is present, and

the cecum was difficult. The success of the operation was due to an excessively mobile cecum and an indulging involution. The cecum was fixed. The course of healing was smooth. Complete cure was confirmed by roentgen ray examination.

(GERLACH) CLARENCE C. REED M.D.

Nordentoft J. Two Cases of Megaduodenum. *Acta radiol.* 1937 18 722

Considerable uncertainty still surrounds the conditions of megaduodenum. The term itself merely implies an enlargement, an increased capacity of the duodenum without reference to the causes of the condition. The author points out that these causes may be extrinsic or intrinsic. Without doubt any disorders or abnormalities in any of the many widely different organs closely surrounding the duodenum may affect the anatomy and physiology of that organ itself. Besides these abnormalities in the duodenum itself, congenital or acquired may cause pathological dilatation of the organ. The most frequent and best known cause of megaduodenum is duodenal stenosis either congenital or of later development on a pathological basis.

Two cases of megaduodenum are reported by the author from observations made by him at the State Hospital in Copenhagen. The first of these was one of true duodenal stenosis due to congenital organic malformation. The patient a girl of two years was admitted to the hospital with a history of copious intense vomiting since birth. Usually the vomiting would occur a long time after a meal. For instance carrots would be ejected about five days after ingestion. Almost any food given her would be ejected, even oatmeal soup. Naturally she was thin and of slender build. Roentgenological examination showed the duodenum to be much enlarged with stenosis at the junction of the duodenum and the jejunum. Operative findings disclosed an enormous duodenum with thick gray hypertrophic walls. The circumference of the duodenum was about the same as that of the stomach. The pathogenetic conditions could not be determined with certainty. Duodenojejunostomy was performed with salutary results. The operation failed to reveal any stricture though both the previous history and the clinical picture suggested it. Moreover the roentgenological examination had shown a canalicular constriction at the junction of the duodenum and the jejunum.

The second case reported by the author was one of megaduodenum in which no positive cause for the existence of the condition could be demonstrated. Clinically the picture was very different from that of the first case. The patient a young man of twenty five years had been suffering from periodical pressure pains in the epigastrium since childhood but never with vomiting. Roentgenological examination showed a greatly dilated duodenum simulating the stomach in size. In this instance no stenosis could be detected. Operative findings disclosed a strongly distended duodenum embedded in a close network of adhesions. Nothing could be demonstrated how

ever, which would reasonably explain the cause of the condition. Stenosis could not be demonstrated while the numerous adhesions between the duodenum and the surrounding tissues could be regarded as secondary changes. The duodenojejunostomy gave salutary results. This was certainly a case of megaduodenum of doubtful origin.

The author observes that while formerly it was quite generally taken for granted that megaduodenum and stenosis of some sort or other went hand in hand the trend of opinion during the last decades has been somewhat different. There now seems to be a feeling that other factors than congenital malformation may be accountable. Neurogenetic factors have formed the subject matter for studies by Melchior and Kostlivy. Recently the same factors were discussed by Petren while Duval Roux and Beclere described a pathological picture in which one of the features was the existence of numerous adhesions about the duodenum again without any positively demonstrable cause.

The author points out that in all probably all transitions may be found from very slight enlargement to extreme dilatation with a surprising absence of symptoms. With so much uncertainty still surrounding the condition of megaduodenum it becomes imperative that all cases be studied with great care. The roentgenological diagnosis with observations especially as to motility is of great value. Stenosis can sometimes be demonstrated by it whereas experience has shown that it is frequently difficult or even impossible to discover the cause of megaduodenum by operation. The condition of the stomach also should be observed with a view to the possible detection of any disorder which might possibly affect the nerve supply of the duodenum.

MARTIN J. SERRAT M.D.

Kalayhan B. Carcinoma of the Jejunum. *Radiol.* 1937 29 596

The author reports a case of carcinoma of the jejunum in which a pre-operative diagnosis of carcinoma was made from the roentgenological findings. One patient was a white male thirty nine years of age and the other a white female sixty years old.

Carcinoma of the small bowel is not as uncommon as was formerly believed. Patients with indefinite abdominal distress vomiting which increases in frequency and occult blood in the stool should be carefully examined for the presence of malignancy of the small bowel. Examination of the stomach duodenum and colon is not sufficient too often the findings are negative and the patient is dismissed. Careful persistent and repeated examinations of the small bowel are necessary if more accurate diagnoses of these obscure cases are to be obtained. Numerous reasons for the infrequency of carcinoma in this region have been given among them being the fluid content of the bowel the alkalinity of this content and the absence of sharp bends in the bowel. The age incidence is approxi-

chitis, while before the operation the evidences of urinary tract infection are neglected. Often the author has been called in consultation in cases after an appendix operation because of the development of urological symptoms and has found a ureteral calculus, a ureteral obstruction, pyelitis or pyelonephritis, and sometimes even a urinary-tract infection or obstruction on the left side, causing reflex pain on the right side. In such cases a ureteral catheterization with the injection of soothing and antispasmodic drugs would have relieved the abdominal symptoms. In other cases the urinary-tract infection may be secondary to the appendicitis, or albuminuria or hematuria may result from toxemia, which may be produced by a general colon-bacillus infection or by the toxins from the infected appendix alone.

According to the author's observations there are many patients operated upon for appendicitis who in reality have colitis with colon-bacillus infection localizing in the kidney and renal pelvis. He estimates that this occurs in 50 per cent of cases operated upon for appendicitis without relief of symptoms, especially in subacute or chronic cases.

ALICE M MEYERS

Shelley, H. J.: The Incidence of Asymptomatic Pathological Conditions of the Appendix Based on a Study of 2,065 Consecutive Incidental Appendectomies. *Arch Surg*, 1937, 35 621

A very thorough investigation has been made of pathological conditions of the appendix which were found when the appendix was removed incidentally during operation upon other organs within the abdomen. The findings are based on the records of 2,065 consecutive and incidental appendectomies which were performed in the period between 1925 and 1935, inclusive. Cases in which present or past diseases of the appendix were suspected before operation are not included.

The regions of the primary operation were the female genital organs, gall bladder and liver, hernia, stomach and duodenum, colon, small intestine, and other intra-abdominal regions. The mortality percentage was well within normal limits, with the exception of those cases in which the colon was involved, in which the mortality was almost 30 per cent. This fact should warn surgeons in general never to attempt an incidental appendectomy along with colon operations.

Calculations as to the incidence of pathological conditions in the appendix are based on 1,904 specimens examined microscopically. In 37 per cent of the appendices there was no definite evidence of inflammation, on the other hand, 62 per cent showed definite inflammatory change, 2 per cent of these being acute changes.

Chronic obliterative appendicitis with infiltration was found to a large extent in older patients. These patients were poorer operative risks, and the increase in mortality brings up the question of whether or not

these patients should have been subjected to an incidental appendectomy.

There was a slight increase in the incidence of appendicitis when inflammation was present elsewhere in the abdomen. This increase was greatest in the group of appendices affected with periappendicitis. Cases showing chronic, suppurative, and acute salpingitis were not included in this group.

There is no evidence to substantiate the belief that chronic inflammation in the appendix initiates inflammation in the gall bladder, in fact, a slight variation in the opposite direction is found in these charts and tables.

In the presence of inflammation elsewhere in the abdomen, there was a definite increase in the incidence of inflammatory change in the appendix. Chronic obliterative appendicitis was found to occur more often in the middle and later decades of life.

The incidence of the total number of appendices without inflammation decreased gradually with age. The decrease in the incidence of normal appendices was slightly more marked. The incidence of the total number of appendices showing inflammatory change increased with age.

The author lists the percentages of other pathological conditions as follows: oxyuris in the lumen of the appendix, 0.2 per cent, mucocele of the appendix, 0.2 per cent, tuberculosis of the appendix, 0.3 per cent; diverticulum of the appendix, 0.1 per cent, hyperplasia of the mucosa, 0.2 per cent, and tumors of the appendix, 0.2 per cent.

Acute appendicitis, even with actual suppuration, can exist without any subjective or objective evidence of its presence. Its incidence in this series was 1.7 per cent. Although the author does not present any figures, he mentions the fact that the incidence of postoperative complications was not found to be greater than would be expected in a similar list of operations in which appendectomy was not performed. No increase in mortality was found. The conclusion was drawn that the incidental removal of the appendix in properly selected cases is a worthwhile procedure.

RICHARD J BENNETT, JR., M.D.

Devine, Sir H.: Excision of the Rectum. *Brit J Surg*, 1937, 25 351

This article is based upon clinical material and experience gained from a series of 60 patients who were operated upon for excision of the rectum. In surgery of the rectum, carcinomatous growths are the most exacting of the rectal problems and they constitute more than one-third of all the tumors of the alimentary canal. The author believes that surgery for carcinoma of the rectum is well worth while, although the operation may be difficult and serious, and the operative risk may be high for the patient. About one-half of the author's cases were of a moderate degree of malignancy and many of the patients have survived for from ten to fifteen years.

The conditions peculiar to the rectum which are adverse to operation, and which involve special difficulties, are as follows.

has offered its dependable conclusions about the neoplastic or non neoplastic nature of the tumor, it has made about as great a contribution to the final diagnosis as may be expected of it. There are no fundamentally reliable roentgenological signs by which the various etiological types of inflammatory tumor can be distinguished from each other and the final diagnosis often if not usually reads *non neoplastic tumor of indeterminate etiology*.

The filling defect produced by neoplastic lesions which have perforated or which have otherwise been complicated by infection looks much more like the filling defect of the inflammatory tumors than like that of the true neoplasms. Diacritical roentgenological signs of the original lesion are not however obliterated beyond the point where roentgenological methods fail to reveal them and it is here that familiarity with the internal relief of the neoplastic lesion is of particular value.

The fundamental importance of obtaining adequate visualization of the entire extent of the filling defect, and of making a most careful study of the structural detail of its internal relief should be obvious. It may be said that a dependable roentgenological diagnosis of 'neoplasm with perforation' can be made whenever it occurs and to confuse the condition consistently with the non neoplastic tumor is to fail to exact the full diagnostic yield of the roentgenological examination.

SURGICAL CONSIDERATIONS

Clinical signs and symptoms although more indicative may in certain instances be all but pathognomonic but they are always of great value. Bergen and Dixon have described certain features of perforating neoplasm which have been of great diagnostic utility. One of these is the character of the reaction following the pre-operative intraperitoneal administration of a vaccine prepared from bacillus coli and streptococci. The normal reaction in the presence of non perforating lesions of the colon is an elevation of the temperature of the body from normal to 101° or 102° F. within ten to twelve hours. A similar reaction seems to be evoked by metastatic lesions in distant organs.

The existence of infection and neoplasm entails difficulties not encountered if the lesion is purely neoplastic or purely inflammatory. Whether complicated by infection or not neoplastic lesions demand radical treatment yet the very presence of infection may seriously impede the institution of the more radical surgical procedures indicated.

The surgical treatment of diverticulitis provides an exemplification of these principles. In many instances this condition may be treated satisfactorily without surgical intervention. A combination of a low residue dietary regimen, methods of applying local heat and anti spasmodic drugs administered liberally often effects subsidence of the inflammatory process within reasonable limits of time.

The formation of pericolic abscess with and without extension to adjacent pelvic viscera especially

to the urinary bladder with the development of sigmoidovesical fistula, are among the more frequent complications of diverticulitis. Fecal fistula may develop following drainage and necessitate surgical treatment such as segmental resection. Spontaneous closure of the fistula may follow establishment of a temporary colonic stoma without direct attack on the fistula itself. After closure of the fistula the continuity of the bowel can be re established. Surgical treatment is usually necessary to bring about closure of a sigmoidovesical fistula.

In the surgical treatment of intestinal tumors, it seems worth while to remark briefly about the use of intraperitoneal vaccine pre-operatively. Accumulating experience seems to indicate that by this means the mortality from intestinal surgery is appreciably reduced. Intraperitoneal vaccination is therefore recommended. If gross contamination occurs during an operation on the intestine the result to the peritoneum may be too great for it to overcome. The authors' observations lead to the belief that the death rate following removal of perforated lesions of the intestine has also been reduced as a result of the use of these serums.

Experience also indicates that the operative mortality can be reduced still more if some kind of short circuiting operation is carried out before the diseased segment of intestine is resected. Short-circuiting or side tracking procedures are of particular advantage if the perforating lesion is situated well above the sigmoid colon. As a rule such operations are not employable for lesions of the sigmoid or lower pelvic colon because if the greatest care is not exercised contamination will occur when the lesion is subsequently removed.

If feasible perforating lesions of the colon are most satisfactorily managed by using a short-circuiting procedure as the first stage of the operation. The use of anaerobic serum is recommended only because some of the fatal peritoneal infections following operations on the colon have with apparent justification been attributed to anaerobic micro organisms.

Ströminger L. Appendicitis and Urology 4. Clinical and Critical Study (L'appendicite et l'urologie. Etude clinique et critique). J. urol. med. chir. 1937 44 327.

Ströminger maintains that the technique of the operation of appendectomy has been so far perfected that there is too great a tendency to operate for the removal of the appendix in cases with pain in the right lower quadrant without a sufficient diagnostic study. Unless the symptoms are severe and definitely indicate cause of appendicitis in most of such cases a careful urological examination should be made. Often evidence of a latent infection of the kidney will be found a pyuria or a microscopic hematuria sometimes hydronephrosis ureteral calculus or pyelitis will be discovered in this way and an unnecessary appendectomy avoided.

The urologist is often not consulted until urinary symptoms develop after the operation for appendicitis.

malignant invasion The liver is explored for metastases. One or two nodules do not preclude operation, but multiple nodules do. Next, the gland-bearing areas along the aorta and mesosigmoid are examined. Finally, the growth itself and the peritoneum in the floor of the pelvis are inspected. Gland involvement does not preclude operation but peritoneal involvement does, unless it is possible to incise the peritoneum extensively.

If operation is decided upon, the first step taken is to mobilize the sigmoid. Congenital folds or bands of peritoneum are often present on the lateral aspect of the sigmoid. Incision of these makes better exposure possible and assures a loop long enough for colostomy. Next, the inferior mesenteric artery is ligated just below the first sigmoid branch. This insures a bloodless field for the pelvic dissection. The incision of the peritoneum down to the floor of the pelvis on both sides of the mesosigmoid follows. These incisions are then brought forward to meet anteriorly behind the base of the bladder in the male or the pouch of Douglas in the female. Complete dissection of the rectum, both anterior and posterior, is then made. The so-called "rectal stalks" are likewise divided as far laterally as possible.

Now comes the construction of a new pelvic floor. To do this, the peritoneum is freed on the lateral walls of the pelvis and the posterosuperior surface of the bladder. In the female the fundus of the uterus may be utilized if the uterus has not been removed previously.

Finally the bowel is divided at a convenient point to make a well fitting colostomy. The division of the bowel is left until last, after the entire dissection has been made. The division is made by cautery between Payr clamps. The ends of the bowel are tied and a piece of rubber dam is placed over each end and again tied. The distal end of the pelvic colon is then pushed downward into the presacral space and the peritoneum of the new pelvic floor is sewed over it. There must under no circumstances be any tension on this new diaphragm.

Closure of the abdomen follows. The proximal end of the colon is brought out for permanent colostomy. Dressings are placed over the incision and around the colostomy to avoid any undue pressure when the patient is placed on his abdomen for the next, the perineal, stage of the operation.

With the patient placed in the Kraske position, an incision is made from the midsacrum down to and encircling the anus. Lateral dissection of the flaps ensues until the gluteus maximus muscle is brought into view. All the fat mesial to it is removed with the rectum. In most cases the coccyx is disarticulated to facilitate dissection. Immediately beneath the coccyx is the presacral fascia. This, when incised, brings into view the cavity containing the loop of bowel, provided the abdominal dissection has been done thoroughly. The levator ani muscles are divided as far laterally as possible, and the bowel is drawn out and dissected away from above downward.

There remains now a large cavity bounded in front only by the bladder and bony walls of the pelvis. Nothing can be sutured together to obliterate it. It must heal by granulation. Into this cavity a large rubber square is placed. Gauze is packed into the dam to prevent it from adhering to the new peritoneal floor. This is packed tightly to prevent oozing and help support the new pelvic floor. The incision is then closed with a subcuticular stitch. Part of the dam is removed on the second day and part on the third day. By the fourth day it is always entirely removed. The wound heals completely by granulation in from ten to twelve weeks.

Jones reports that patients are out of bed on the fourteenth day and that the average time in the hospital is twenty-four days. Inasmuch as the mortality has been kept to about 10 per cent, this surgical procedure for carcinoma of the rectum has much in its favor. **MATHIAS J SEIFERT, M.D.**

Milligan, E. T. C., Morgan, C. N., Jones, L. E., and Officer, R.: Surgical Anatomy of the Anal Canal, and the Operative Treatment of Hemorrhoids. *Lancet*, 1937, 233 1119.

The authors discuss the anatomy of the anal canal. They describe the submucous space which lies between the mucous membrane and the internal sphincter. The internal hemorrhoidal plexus lies within this space. The perianal space, which contains the external hemorrhoidal plexus, is, as the name implies, the space surrounding the anus. The perianal space is limited above by the insertion of the longitudinal muscle at the anal intermuscular septum, superficially it is limited by the skin, and externally it becomes continuous with the ischio-rectal fossa. Thus an internal hemorrhoid lies in the submucous space and an external hemorrhoid lies in the perianal space. The internal and external hemorrhoidal plexuses communicate by way of vascular channels in the longitudinal muscle.

The operation of hemorrhoidectomy is performed with the anesthetized patient in the lithotomy position. The tag of skin corresponding with the hemorrhoid having the greatest tendency to prolapse is grasped with a forceps and drawn laterally away from the anus. This tension causes the anal mucosa covering the internal hemorrhoid to appear outside the anal canal. The hemorrhoid is grasped and further traction brings into view a longitudinal fold of rectal mucosa, which is grasped with a hemostat. The remaining two hemorrhoids are delivered in a similar manner, thus hemorrhoids are exposed at "3, 7, and 11 o'clock" on the anal ring.

With the tip of the index finger in the anal canal, pressure is exerted outward at the level of the subcutaneous external sphincter to distend the hemorrhoid. With scissors a V-shaped incision is made in the skin with the base at the anocutaneous line and extended to the outer border of the distended hemorrhoidal plexus. The incision is extended through the corrugator cutis ani until the circular band of the

- 1 Its septic contents
- 2 The powerful muscular movements of the rectal wall when discharging fecal contents. The sphincteric apparatus will not permit a wound or lesion that is proximal to it and located in the rectal wall to heal in the normal manner
- 3 The inaccessible situation of the rectum encased in the bony pelvis
- 4 The surrounding loose area and the absence of rectal peritoneal covering

Conditions such as these demand that operations on the rectum be performed on a defunctioned rectum

If the distal colon is disconnected from the proximal colon, and is thus completely deprived of its function this isolated rectosigmoid segment gradually loses a large percentage of its bacterial content. With the proper preparation (lavage) this bacterial content becomes further reduced. Operations on this defunctioned and prepared rectocolic segment can be carried out without much danger. Operation on a defunctioned rectum marks a distinct advance in surgery. The reason for this is that not only is healing of the anastomosis prevented by the continual movement and the back pressure from sphincteric obstruction which occurs in the functioning rectum but also the unperitonealized rectum heals very precariously. Thus primary union scarcely ever takes place and death often results from the leakage of septic contents which infect the loose area surrounding the rectum.

The defunctioning of the distal colon and rectum is accomplished by disconnecting the proximal colon from the distal colon either at the middle of the transverse colon or at the hepatic flexure. The bowel is cut across and each end is separately implanted into the abdominal wall, so that an area of skin intervening between the openings prevents the passage of any feces from the proximal to the distal colon. The second requirement is the easy and prompt restoration of the function of the distal colon. This is attained by making a long spur and by suturing for a distance of about 4 in. the proximal to the distal limb of the transverse colon. The bowel opening is made small so that its mucous membrane edges lie just under the skin. The smallness of the opening and the absence of any protruding mucous membrane facilitate natural closing after the spur has been crushed. The contents of the distal colon are washed out from above the abdominal fistula and also by washings of the rectum. Anti-septic solution helps to diminish the bacterial content. In the case of carcinoma with obstruction irrigations for as long as three weeks may be necessary to prepare the bowel properly.

The standard operation for carcinoma of the rectum is the Miles operation in which the sigmoid and its mesentery the rectum and the anal canal are removed. It is conceived on sound logic and will probably remain the standard operation. Since this operation is primarily an abdominal dissection of the rectum it is attended with a good deal of shock.

It is scientifically designed, radical and ruthless, and leaves the patient incontinent. It is the proper operation for all low lying and all unfavorable types of rectal growths. Where the growth is located in the lower end of the sigmoid and its resection also involves the removal of the upper part of the rectum the author approaches it from the abdomen, isolates and dissects the diseased segment, dissects the upper part of the rectum from above and anastomoses the divided sigmoid to the rectal stump.

From the author's study and experience with rectal surgery the following conclusions are drawn:

Pre-operative defunctioning and preparation of the rectum and sigmoid make possible rectal operations which had previously been regarded as impossible. A rectosigmoid anastomosis becomes a reasonably safe operation. By the employment of a special operative position (exaggerated lithotomy) with a sacral sling synchronized perineal and abdominal operating can take place a method which shortens considerably the time of operation and therefore lessens shock. By performance of the operation in the position advocated above and on a defunctioned rectum closed at its lower end by a special box clamp dissection of the rectum may be safely carried out from the perineum toward the abdomen. This method has many advantages.

The author does not suggest more conservative operation but only that it is greater surgical art to utilize our pathological knowledge of carcinoma of the rectum by employing the conservative operation more frequently than has hitherto been the case.

JOHN W. ARMSTRONG, M.D.

Jones T. E. The Surgical Treatment of Carcinoma of the Rectum. *Surg. Clin. North Am.* 1917, 11: 1129.

The author gives an interesting detailed description of his operative technique in carcinoma of the rectum. For the most part the procedure is that of Miles of London, namely the one stage abdominoperineal operation which bears his name.

Jones recommends spinal anesthesia for this operation as it can be done more rapidly with a quiet relaxed abdomen. The use of adrenalin counteracts any fall in the blood pressure below 80 mm. of mercury. The use of pinal anesthesia makes it possible to work in the perineal region for a considerable length of time after the abdominal anesthesia has worn off.

The operation necessitates deep pelvic dissection. Therefore as soon as the anesthesia has reached the level of the umbilicus a catheter is placed in the bladder and the patient is placed in a deep Trendelenburg position which makes it possible to pack the intestines well out of the pelvis. Jones uses the midline incision below the umbilicus in preference to the right rectus incision used by Miles because it is easier to make easier to close, and results in fewer hernias.

After the incision has been made it is imperative to make a careful survey to determine the extent of

gram as soon as the abdomen is opened. The site of the obstruction and any peculiarities of the bile ducts are thus determined and the condition dealt with as indicated. The organs should not be disturbed.

Several methods are at one's disposal for restoring the flow of the bile, which restoration is the end to be attained. Formerly the drainage of Kehr was widely used, but now it is only resorted to if inflammation or changes in the common duct preclude a plastic operation. Choledochoduodenostomy, cholecystogastrostomy, or cholecystoduodenostomy are used more generally now.

According to the principle to avoid dissection and removal of the organs in all difficult cases in order to limit postoperative complications as much as possible, extirpation of the gall bladder is contra-indicated and only the removal of the stones is carried out. If, however, the gall bladder is markedly atrophic as a result of inflammatory changes without stones, it is sufficient to destroy the remaining portion completely by use of the round diathermy electrode or mucoclasia. (BODE) JOHN A. GRIS, M.D.

Paulson, M.: Newer Aspects of Gall-Bladder Disease of Practical Import. *Med Clin North Am*, 1937, 21: 1489

Gall-bladder operations frequently do not give the anticipated relief from symptoms for which they were performed. First-rate clinics are reporting that about 33 to 43 per cent of those submitted have felt that little or no benefit was derived therefrom.

Changes in the gall bladder interfere with its absorption and secretion activities. Three pathologicophysiological processes may result from a disturbed relationship between the sphincter of Oddi and the gall bladder: (1) increased activity both of the gall bladder and the ampulla with rapid emptying. This is known as the hyperkinetic type of evacuation, (2) contraction of the gall bladder against spasm of the sphincter resulting in biliary colic and called hypertonic dyskinesia, (3) an atonic gall bladder in consequence of a spastic sphincter with a resulting heavy, aching sensation.

If the patient suffers from frequent attacks of colic caused by calculi, removal of the stones is indicated and the results are striking. Surgery gives little relief from mild symptoms and mild gall-bladder changes. The problem becomes relatively easy when the following symptoms are found: (1) a satisfactory account or evidence of one or more attacks of biliary colic, with or without fever, chills and jaundice, (2) residual tenderness following such painful episodes, and (3) possibly indigestion between attacks, characterized by flatulence, bloating and discomfort. However, if diagnosis is to be improved and if a better selection of cases for medical and for surgical therapy is to be made, the possible presence of any one of several other conditions, or a combination of them resulting in similar, if not in identical complaints, must be more readily recognized. Thus, gall-bladder colic may be simulated by *tabes dorsalis*, perforating

peptic ulcer, renal calculi, hydronephrosis, and root pains of spinal and vertebral lesions. It will be important to know whether the colic is due to stones or to the afore-mentioned pathologicophysiological state of the contraction of the gall bladder against a spastic sphincter of Oddi, designated as hypertonic dyskinesia.

The jaundice suspected of being obstructive may be intrahepatic or hemolytic, or may be a manifestation of familial or congenital hyperbilirubinemia, pernicious anemia, or carotinemia.

Aside from atypical manifestations of peptic ulcer, small intestinal deviations, and reflex renal lesions, the same symptoms, sometimes designated as gall-bladder dyspepsia, will also be found in some cases with low metabolic rates, in chronic nervous exhaustion with or without demonstrable changes in tone and/or secretion of the digestive apparatus, in constitutional inadequacies with and without affective disorders in the irritable colon, and in some cases with any change in digestive function on a psychogenic or neurogenic basis.

The two most valuable aids in the determination of the extent of pathology and the presence of stones available are the non-surgical biliary drainage of Lyon and cholecystography.

Cases selected for surgery should be limited to those which present stones and relatively advanced gall-bladder changes, and in which there is evidence of more than one attack of biliary colic. Cases selected for medical management should consist of those who fail to meet the criteria for surgical intervention. For acute gall-bladder disease, fat and fruit juices are interdicted. In the chronic disorders, individual tolerance to these foods must be ascertained. In general, a well balanced and smooth diet, in which the physical, chemical and mechanical factors are reduced, will suffice. Atropine and its derivatives, sedation, and oil by mouth and by rectum are helpful. Finally the patient is to be assured that the extent of the disease bears little or no relation to his complaints and that the prognosis is good.

Pain, jaundice, and possibly dyspepsia following surgery suggest the following: (1) a hepatitis which may arise from the gall-bladder infection, carried by the lymphatics, or from an ascending cholangitis, (2) a stricture or stone in the common duct, or (3) slowly regressing inflammation or the passing of mucus and debris. CHARLES BARON, M.D.

Fenster, E., Herrmann, O., and Herrmann, K.: Experimental Study of the Development of the Stippled Gall Bladder (Experimentelle Untersuchungen ueber das Zustandekommen der Stippchengallenblase). *Deutsche Ztschr f Chir*, 1937, 249: 177.

Boettcher first described this condition in 1857. The frequency ranges between 6.3 and 26 per cent. As to its causes, the opinions are divided. Inflammation producing precipitation of cholesterol and lymphatic stasis which results in fat absorption in

subcutaneous external sphincter is laid bare. The tissues are dissected away from the subcutaneous external sphincter until its inner border is exposed where the fibers of the longitudinal muscle will be seen.

The dissection having been completed the entire hemorrhoid, i.e. internal and external hemorrhoidal plexuses with their coverings of anal mucosa and the skin of the anus swings free on its pedicle. This pedicle consists of rectal mucous membrane submucosa containing a branch of the superior hemorrhoidal artery and vein, and part of the longitudinal muscle. The pedicle is tied firmly. The other two hemorrhoids are treated likewise and at least $\frac{3}{4}$ in of intact skin is left between each wound. Finally all excess tissue beyond each of the three ligated pedicles is excised and the ligatures are cut short.

The operation is completed by inserting a vaseline coated rubber tube into the rectum and tucking pads of wet gauze in the anal canal beside the tube in relation to each wound. If an anterior or posterior secondary hemorrhoid is present it is removed through a separate minor skin incision.

EARL O LATIMER M.D.

LIVER GALL BLADDER PANCREAS, AND SPLEEN

Sjöström P. The Citrate Content of the Blood Serum as a Diagnostic Factor in Diseases of the Liver and Bile Passages (Der Citratgehalt im Blutserum als Diagnostikum bei Krankheiten der Leber und der Gallenwege. Eine methodologische tierexperimentelle und klinische Studie). *Acta chirurg Scand* 1937 79 Supp. 49.

The author reports detailed studies in progress since 1933 of the problem of citrate metabolism with particular reference to hypercitricemia. The work was early planned on the working hypothesis that the chief part was played by the liver. The book is divided into three sections concerned with method, animal experiments and clinical studies. The method used is based on the Thunberg enzymatic micro method for the quantitative determination of organic vegetable acids in biological fluids. Certain obscure points in the Thunberg Citrate Method necessitated a rather searching inquiry. The animal experiments as a whole furnished strong support for the assumption that the liver plays a very important part in citrate metabolism. Blood citrate estimations to the number of 3,400 were made in 1,150 patients with many different diseases. The limits for normal values in the fasting state were set between 17 and 27 micrograms. Routine fasting determinations were made. When the values were high citrate tolerance curves were made after the intravenous or peroral administration of citrate. When from ten to thirty times the amount of total citrate found in the blood was used a rise of short duration and not above 27 micrograms occurred in normal cases. In pathological cases higher values were obtained and, more important, the return to

the original value was slow and not complete within two hours. Patients with acute hepatitis exhibited a rise of 79 per cent in chronic hepatitis the rise was less intense and sometimes absent. In cases of doubtful jaundice the rise in blood citrate often gave valuable information in the differential diagnosis between hepatitis and stasis jaundice when customary liver function tests were of no aid. In chronic cardiac insufficiency a moderate rise was found which as a rule disappeared when compensation was established. In exophthalmic goiter 45 per cent of the cases had moderate hypercitricemia.

The author concludes that in many situations the citrate content of the blood serum has proved a good gauge of liver function and that in preventing hypercitricemia good liver function seems the most important factor. The author's summary is reproduced in English and in French. He gives 309 case reports, a bibliography and an index of 144 pages.

WALTER H. NADLER M.D.

Mirizzi P. L. Mechanical Icterus (Mechanischer Ikterus). *Deutsche Zeitschr f Chir* 1937 249 145.

In obstructive jaundice it is best to perform operation early, that is, before infection or injury to the liver cells becomes advanced. In most cases an impacted stone produces the jaundice but other causes are not infrequent. Recurrent pain with jaundice and fever is especially to be heeded. Obesity lowers the resistance of the patient and makes the operation difficult. The age of the patient should not be the deciding factor in determining whether operative or conservative measures are to be carried out but it should be considered in evaluating the defensive forces of the patient. The tendency toward hemorrhage, chills and rapid emaciation and frequent vomiting as well as other symptoms are important indications which require early surgical interference under local or spinal anesthesia. The longer the obstruction persists the greater the danger to the patient. The prognosis is always doubtful especially when the jaundice has existed for a long time.

When operation is done the final result is often dependent on the type of operation and the technique. The tendency to hemorrhage and suppuration demands careful and conservative procedures. Blood dissection of adhesions is to be avoided and the tissues are to be handled with the utmost gentleness. Anatomical relations are often obscure and the individual relations cannot be recognized nor the site of obstruction determined by inspection nor palpation. Damage to tissues with bad results which are often seen can be accounted for only by unnecessary procedures and rough handling of the bile ducts.

By means of the author's method of operative cholecystography one can gain a clear view of the condition under consideration rapidly and without the dangers previously referred to. This method consists of puncture of the gall bladder injection of 10 c cm of lipiodol and the taking of a roentgeno-

occurs in carcinoma of the head of the pancreas, carcinoma of the lower end of the common duct, pancreatitis, stricture or injury of the common duct, or is caused by a stone in the common duct that cannot be removed.

This paper, which is based on the studies of various authors, records 221 such cases with an average mortality of 41.1 per cent. The authors refer to one interesting contrast which was brought out by Bernhard in a report showing a mortality of 23.1 per cent for cholecystogastrotomies, 31.7 per cent for cholecystoduodenostomies, but only 8.6 per cent for choledochoduodenostomies.

The cases of 2 patients in whom persistent cystic-duct obstruction was present and in whom the condition was relieved by choledochostomy are reported. The value of cholangiography in determining patency of the cystic duct is stressed. Also reported are the cases of 2 other patients who died following anastomosis of the gall bladder to the stomach. In these 2 patients, cystic-duct obstruction was present at the time of surgery, as was demonstrated by the cholangiogram.

The total number of the authors' cases was 7, with 3 deaths, a mortality of 42.8 per cent.

The fallacy of the older criteria for patency of the cystic duct is pointed out. The authors realize that decompression of the gall bladder may often provide drainage after the edema about the cystic duct has subsided, but they also believe that in the severely jaundiced patient, the added burden of an operation which does not offer some immediate mechanical or physiological relief accounts for the high mortality rate.

In conclusion it is stated that if a probe cannot be passed through the cystic duct, a cholangiograph should be taken, or the common duct should be attacked directly, despite the greater mechanical difficulty of the operation.

THOMAS C. DOUGLASS, M.D.

Mirizzi: Results of the Fourth Series of 100 Operations on the Biliary Tract under the Control of Cholangiography during Operation (Constata-tions et résultats de la quatrième série de 100 opérations sur les voies biliaires principales, sous le contrôle de la cholangiographie opératoire) *Mém. l'Acad. de chir., Par.*, 1937, 63: 1195.

In this article, Mirizzi reports his results in a fourth series of 100 cases of operation on the biliary tract in which his method of cholangiography during operation was employed. The results in these cases again demonstrate the value and the safety of this procedure. In this series, the most common lesion was cholecystitis with stones (70 per cent). In 57 per cent of the series a cholecystectomy without drainage was done, in 24 per cent a cholecystectomy combined with some type of operation on the common or cystic duct was done. The most common cause of duct obstruction was stones in the common bile duct, in 10 cases there was stenosis of Oddi's sphincter without any other form of obstruction,

and in 9 cases there was stenosis of the sphincter with stones in the duct.

In this series of 100 cases there were no operative deaths and no serious postoperative complications, 2 patients developed congestion at the base of the left lung, but this cleared up within four days in each case. There were 16 cases in men, a larger percentage than in the author's previous series. Duct obstruction requiring operation on the ducts occurred in only 5 of these cases. Usually mortality from operations on the biliary tract is higher in males than in females, but in these 16 cases post-operative recovery was excellent, without complications in any case.

The results in this entire series are an indication of the value of cholangiography during operation. This procedure makes it possible to locate any obstruction in the ducts at the time of the operation on the gall bladder, so that the operation can be planned to remove or overcome such obstruction with a minimum of trauma. On the basis of the findings by cholangiography in this series, operations were done on the bile duct in 37 cases, as follows: choledochotomy in 19 cases, cysticoduodenostomy in 13 cases, external choledochoduodenostomy in 5 cases, and cysticogastrotomy in 1 case.

ALICE M. MEYERS

Hunt, H. B., Hicken, N. F., and Best, R. R.: Exploration of the Biliary Ducts by Cholangiography during and following Operation. *Am. J. Roentgenol.*, 1937, 38: 542.

The authors present their experience with cholangiography in 56 patients and correlate it with existing data from the literature. Hicken has introduced the term "delayed cholangiography" for post-operative visualization with injection by way of drainage tubes or fistulas, and "immediate cholangiography" for visualization immediately at the time of operation. In the former method from 15 to 40 c.c. of contrast medium are injected through the drainage tube under gravity pressure of from 30 to 50 c.c. of water or slight pressure exerted through a syringe with the patient placed supine on the roentgenographic table. In the latter method the radiopaque medium is injected by way of the gall bladder, cystic duct, or common duct, the procedure depending on the patency of the cystic duct and the size and availability of the common duct. Injection by way of the common duct is adaptable to cases with a large choledochus. Injection of a normal duct is difficult. In the authors' series, 29 immediate cholangiograms were made, 14 after injection of the gall bladder, 12 of the cystic duct, and 3 of the common duct. The operative field was covered with a small sterile sheet, and the surgeon and assistants stepped aside while the mobile roentgen unit was promptly brought into position. Respiration was suspended by the injection of spinal anesthesia during roentgenographic exposure. Within from seven to ten minutes the film was ready for examination.

the epithelium is accepted by some while others believe there is a disturbance in cholesterol secretion. A combination of both factors is accepted by some. Various animal experiments heretofore have not shed much light on the subject. The authors therefore have repeated the experiments of Patey and Illingworth by which means *stippling* of the gall bladder was produced.

Patey injured the gall bladder wall by crushing it in a first series of experiments. In a second series he ligated the cystic duct and in a third series he injected bacteria into the blood stream and in addition produced hypercholesteremia. The conclusions from this work were that neither resorption nor secretion of cholesterol and not bacterial infection but only trauma and hypercholesteremia are invoked. Illingworth emphasizes that however high the blood cholesterol might be it alone did not produce the disease. It was only when cholesterinemia was associated with a streptococcal infection that the condition resulted.

In the rabbit treated by the method of Patey, the authors always succeeded in producing *stippling* of the gall bladder. The histological changes which corresponded to the typical picture of cholesterosis were present in this series but absent in those animals studied after the manner of Illingworth. There was no reason to consider bacterial infection as the primary cause of the stippled gall bladder. In Patey's animals trauma played the chief rôle. It resulted in a disturbance of the lymph flow. If in addition to trauma there was an increase in the cholesterol then *stippling* of the gall bladder was produced. Therefore we have to deal rather with resorption and not with absorption of the bile. Cholesterol could always be found in the lymph tract and the efferent vessels. The authors do not agree with either Patey or Troell in this regard.

A remarkable secondary finding was the frequency of gall stones which could be explained on the basis of the experiments undertaken. However no explanation of the origin of the gall stones was given. (FRANZ) JONES & GINS MD

Bauer Axel. When is an Operation for Lithiasis or Inflammation of the Gall Bladder Advisable? (Wann soll man einem an Steinen oder Entzündungen der Gallenblase leidenden Patienten zur Operation raten?) *Svensk Läkarskrift* 1937 p 479.

The present report is based on a lecture which the author gave before a group of general practitioners. Consequently many of the points discussed are quite familiar to the surgeon. The author goes back to the statistics of Inderle and Hotz (1923) who on the basis of 2274 cases as compiled from the reports of 56 surgeons computed a mortality of 9.2 per cent including all cases even those that were clearly hopeless. The author shows next the many dangerous risks which a patient with gall stones is facing such as peritonitis, liver insufficiency, icterus with bile tinged hemorrhages and pancreatitis with its high percentage of mortality. The author reaches

the conclusion that all these patients arrive too late for an operation. The blame rests not only on the practitioner but also on the patient himself. Then there is the internist who is responsible for the fact that even after a successful operation a recurrence or relapse frequently occurs. The author very seldom accepts the explanation of adhesions which is often offered. True recurrence of lithiasis is rare. Frequently, it is really a question of cholangitis changes then too the surgeon can easily overlook a stone in the bile ducts even if he practices the rule of always sounding the papilla of Vater in every case of cholecystectomy. If one intends to operate earlier the first prerequisite is to make the diagnosis earlier and an x-ray examination should be performed in every doubtful case. The general practitioner's task is to acquaint the patient with the great dangers which follow each attack. Prompt operations are also necessary in cases of young patients. Statistics show that in the cases of patients not more than forty years of age there is only a 1 per cent mortality. The author demands that all patients with gall stones be promptly turned over to the surgical clinic just as is being done in cases of appendicitis. In hyperacute attacks of peritonitis operation should be performed as soon as possible if the general condition of the patient allows. In other acute attacks with peritonitis one should wait till the shock is spent however further postponement is forbidden by increasing fever and increasing pains. An operation is indicated in all cases of common chronic gall bladder inflammation when the patient has had from one to three attacks with signs of inflammation of the gall bladder when between the attacks tension and discomfort is felt in the upper part of the abdomen when a stretched gall bladder could be felt or when symptoms of pancreatitis appear. Likewise in cases of choledochus stone with fever and rigor one should proceed with an operation as soon as possible. Operation might be postponed in cases of an apparent recession of an existing jaundice. Regarding the late results of operations the author cites the statistics of Krogius (1931) obtained from nine German clinics. Seventy seven per cent of the patients were free from symptoms after the operation, one third of the remainder had more serious complaints after the operation but they were always the result of complications in the bile ducts, the liver and the pancreas and consequently to later operations. (GERIACH) CLARENCE C. REED MD

Best R R and Hicken N F. A Probable Cause for the High Mortality Following Cholecystectomy, Cholecystogastrostomy and Cholecystoduodenostomy in Jaundiced Patients. *SW* 1937 2: 506.

While in the past the surgeon has performed cholecystostomy, cholecystogastrostomy or choledochoduodenostomy for various other conditions these operations are now done primarily for common duct obstruction with increasing jaundice such as

the head. These are purely transitory, however, and pass off in a few minutes. However, it is recommended that the patient be in the recumbent position when the drug is taken. The tablets made for hypodermic use were found to be more effective than the regular triturations.

Trasoff, A., and Searf, M.: Acute Pancreatitis: A Medical Problem. *Am J M Sc*, 1937, 194: 470.

The prevailing opinion concerning the treatment of acute pancreatitis is that it is a serious surgical problem. There has been no appreciable decline of the high surgical mortality rate in acute pancreatitis in the past fifty years. Considerable difference of opinion exists as to the best operative approach and the optimal operative time.

Recently, a new tendency in treatment has been gaining ground. Instead of the generally accepted surgical attack on the disease, non-operative treatment has been resorted to with a considerable decrease in the mortality rate. Favorable reports of conservative therapy by Hartleb, Nordmann, Mikkelson, and others, led Trasoff and Searf to an analytical study of 16 cases of acute pancreatitis. Among 4 operative cases, there was but 1 recovery, while among 12 non-operative cases, there were 9 recoveries, which results show a marked decline in the mortality rate.

Recent interesting studies of Duff and Rich throw considerable light on the pathogenesis of acute pancreatitis. These investigators found that frequently the cause of acute hemorrhagic pancreatitis was in the gland itself and not in factors external to it, such as gall stones, spasm of the sphincter of Oddi, or lymphatic infection. In 13 of 24 pancreatic glands that were studied, the disease was due to obstruction of the pancreatic ducts by a metaplasia of the ductal epithelium. If this new view is correct, the surgeon cannot possibly determine the extent of the pathology while operating.

Trasoff and Searf stress the diastase and lipase estimations in the diagnosis of suspected pancreatitis. There is a marked rise of the urinary diastase in cases of acute pancreatitis. This finding is of great value in the diagnosis. The ease with which this test is made should lead to its more general use.

The estimation of serum lipase is a relatively new test. Lipase exists in minute amounts in normal sera, but is markedly increased when there is a disturbance of the pancreatic function.

These tests for diastase and lipase, which are of great value in clarifying the diagnosis, especially

when correlated with a definite clinical picture, make an early diagnosis possible and warrant the further trial of conservative therapy in acute pancreatitis.

MATHIAS J. SEIFERT, M.D.

Sendrail, M., Cahuzac, M., and Garipuy, A.: Experimental Peripancreatic Sympathectomy (Les sympathectomies péripancréatiques expérimentales). *Presse méd*, Par, 1937, 45: 1797.

Normal dogs, in which exteriorization of the pancreas is easily performed, were used for the experiments. The periaarterial plexus of the superior pancreaticoduodenal artery and of the pancreatic branches of the inferior pancreaticoduodenal and the splenic arteries were resected on their entire circumference to a length of about 3 cm. Doppler's fluid was applied to the vessels and their beds. This surgical and chemical treatment destroyed all the sympathetic innervation of the pancreas and left the fibers of parasympathetic origin intact.

A study was made of the fasting blood sugar, glucose and insulin tolerance tests and biopsies of the pancreas before and after intervention were made. Fasting blood sugar tests made almost daily showed postoperative hyperglycemia with associated glycosuria for the first few hours and then a gradual hypoglycemia lasting from three to ten days. A period of hyperglycemia followed which reached a maximum about the twentieth day. There finally ensued a period of prolonged hypoglycemia lasting until the animal was killed (in one dog from the second month to the eleventh month after operation). In the glucose-tolerance tests in most cases the height and the duration of the blood-sugar rise was gradually lessened and hypoglycemia gradually increased both as regards extent and duration. Insulin-tolerance tests gave similar but less definite results. Anatomical studies showed temporary, postoperative anemia, a gradually progressive and diffuse hyperemia in the first twenty days, congestion, particularly of the islets at the end of the first and the beginning of the second month, and then a gradual return to a normal appearance.

The results obtained suggest that the operation caused a persistent increase in the supply of insulin. Two hypotheses are offered in explanation: (1) that capillary dilatation may make the secretory function of the pancreas more rapid or efficient, and (2) that the sympathetic nervous system may in some manner regulate the activity of the glands, and sympathectomy may directly stimulate the formation of insulin.

WALTER H. NADLER, M.D.

The radiopaque media used were iodized oil in 35 cases, thorotrast in 18 cases and hippuran in 7 cases. Thorotrast (Heyden) offers the medium of highest roentgenographic density, free miscibility with bile and labile viscosity for injection. It is not absorbed from the biliary ducts or from the gastrointestinal tract which eliminates the possibility of any prolonged biological effect. While there may be some question as to its irritant effect on extravasation, a patient observed for eighteen months had no unusual symptoms. Hippuran is readily absorbed in case of extravasation and appears to be safe. Iodized oil is not satisfactory. A summary of the study brought out the following data:

A reflux of radiopaque material into the pancreatic duct is considered evidence that the pancreatic duct enters the ampulla and that the resistance at the sphincter of the ampulla is equal to or greater than the resistance at the distal end of the pancreatic duct or that excessive pressure may have been used at the time of injection. A reflux into the pancreatic duct may occasionally be followed by epigastric pain and transient fever. The occurrence of a pancreatic reflux did not appear to be related to chronic induration of the head of the pancreas. Encroachment of chronic pancreatic induration on the lumen of the common duct produces a funnel-shaped narrowing of the distal third of the duct and dilatation of the duct proximally. Stenosing carcinoma in the head of the pancreas completely obliterates the distal lumen of the common duct above which the lumen abruptly broadens to a diameter of from 2 to 4 cm. A case of sphincterismus which was relaxed by nitroglycerin is presented. The not uncommon postoperative occurrence of a temporary, relative closure of the distal region of the common duct by postoperative edema and spasm secondary to operative trauma and medication is suggested. Stones in the ducts appear as central, mural or terminal filling defects. Recognition of small stones in a large duct is uncertain and sand stones are not usually discerned.

Five cases were encountered in which calculi unrecognized at surgical exploration were subsequently demonstrated by cholangiography. Immediate cholangiography would have avoided a second operation in most cases. Patency of the ducts and freedom from calculi, clots or mucous plugs should be demonstrated before the removal of drainage tubes. Cholangiography is acute cholangitis warrants caution because of the possibility of extravasation and reflux into the pancreatic ducts but it is not definitely contraindicated.

MANUEL E. LICHTENSTEIN, M.D.

Walters W. McGowan, J. M. Butsch, W. L. and Knepper P. A. The Pathological Physiology of the Common Bile Duct. *J Am Med Ass* 1937 109: 1591.

The data which the authors have collected suggest that the administration of morphine is likely to precipitate an attack of biliary colic in some patients

with lesions of the biliary tract. The administration of one sixth grain (0.01 gm.) of morphine in such cases will frequently produce an increase of intra-biliary pressure to from 160 to 300 mm. of water for two or more hours accompanied by severe pain. While a large dose of morphine will decrease sensitivity to pain by acting on the higher nerve centers at the same time it prolongs and even augments the increase in pressure in the common bile duct.

Morphine, codeine and dilaudid produce a marked increase in the pressure within the common bile duct because they produce a spasm in the sphincter at the lower end of the duct. Amyl nitrite, glyceryl trinitrate and theophylline with ethyl enediamine will completely relax the sphincter spasm and produce a fall in the pressure. Certain other drugs which have been tested do not have any effect on the pressure within the common bile duct.

The authors have studied a series of 9 cases in which repeated attacks of biliary colic developed after the gall bladder had been removed. In these cases the subcutaneous injection of one sixth grain (0.01 gm.) of morphine sulphate produced pain, which was completely relieved by the administration under the tongue, of one one hundredth grain (0.0006 gm.) of glyceryl trinitrate or by inhalation of amyl nitrite. In 2 of these cases stones were subsequently found in the common bile duct at operation.

In 2 of the cases pain which was associated with biliary colic and which occurred before cholecystectomy, was relieved by the administration of glyceryl trinitrate. In 3 other cases the patients were relieved of similar attacks which occurred shortly after cholecystectomy.

Patients who have disease of the gall bladder frequently say that morphine gives them a feeling of fullness or makes them sick. The explanation probably is that a normally functioning gall bladder can maintain intrabiliary pressure at a normal level by absorption of fluid and relaxation of its smooth muscle, whereas a diseased gall bladder on the other hand does not possess this function. The authors suggest the use of morphine as a diagnostic procedure in the study of patients who have the postcholecystectomy syndrome. If the administration of morphine brings on an attack of pain and glyceryl trinitrate relieves it, the evidence is in favor of the view that the condition is the result of a disturbance in the sphincteric mechanism at the lower end of the common bile duct, either with or without associated stones in the duct. Administration of glyceryl trinitrate in doses of one one hundredth grain (0.0006 gm.) will relieve the pain associated with the postcholecystectomy syndrome. The authors do not recommend its use except as a temporary measure until after the common bile duct has been explored, since stones in the common duct frequently account for the sphincteric spasm.

The authors have not noted any untoward effects from the use of glyceryl trinitrate except a feeling of warmth, weakness and occasionally of tightness in

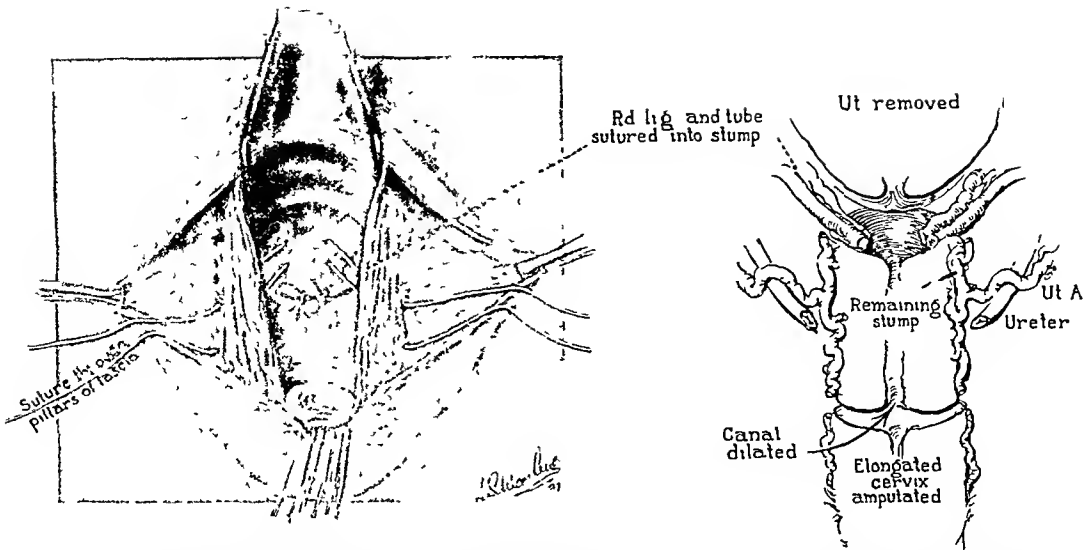


Fig 1 Only that segment of the uterus to which is attached on each side its major supporting structure, the basal portion of the broad ligament, remains. This is interposed beneath the bladder and securely anchored by sutures which also include and approximate the stout pillars of pubocervical fascia.

Richardson, E. H.: An Efficient Composite Operation for Uterine Prolapse and Associated Pathology. *Am J Obst & Gynec*, 1937, 34 814

The admitted incidence of both partial and complete anatomical failure consequent upon utilization of any of the operations commonly employed today in the treatment of advanced genital prolapse is undoubtedly responsible for continuation of the search for a more uniformly dependable reconstructive plan. Inherent defects chargeable to each of the more popular procedures become conspicuously obvious upon a critical comparison of the objective aimed at with that actually attained. Briefly stated, the surgical problem presented by genital prolapse involves first, complete elimination both of actual and potential disease, and, second, restoration with permanent stabilization of normal anatomical relationships. Judged by this standard both colpocleisis and total colectomy, while possessing undoubted merit, must be regarded as "last resort" measures which, even if objectively efficient, are both subjectively and anatomically far from ideal. The entire group of transposition operations are open to the objection that they leave the uterus as a potential source of later benign or malignant disease. In total vaginal hysterectomy the most dependable supporting structures are first partly devitalized by the application of crushing clamps, division, and ligation with constricting sutures, these same impaired structures are then relied upon to furnish the central and main support of the entire reconstruction plan.

By utilization of the time-honored high amputation of the cervix coupled with subtotal vaginal

hysterectomy, existing and potential uterine disease is eliminated, and, also, the supporting structures are relieved of considerable dead weight. By preserva-

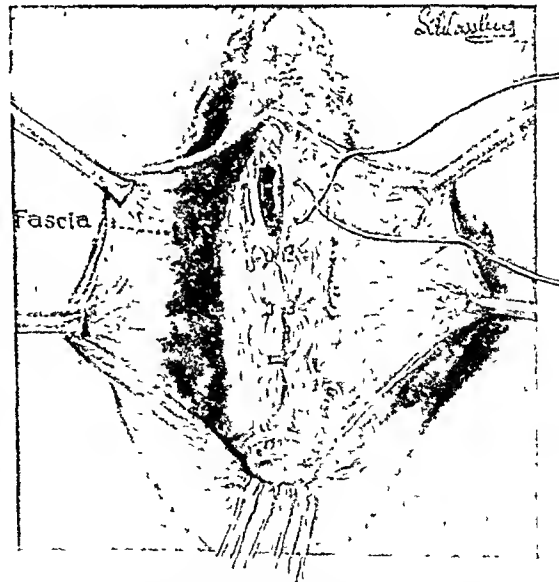


Fig 2 The bladder has been returned to its normal position and is now strongly supported by both the transposed cervical stump and plication of the stout pubocervical fascia.

GYNECOLOGY

UTERUS

Leibovici R and Ivanovitch B: High Suspension of the Uterus in the Treatment of Genital Prolapse (*La suspension haute de l'utérus dans le traitement des prolapsus génitaux*) *Rev de chir Par* 1937 56 582

The authors give a résumé of the literature on the treatment of cystocele and rectocele associated with uterine prolapse or retrodisplacement of the uterus discuss the objections to the various procedures and then describe in detail a modification of the high fundic fixation which they felt was particularly adapted to younger women who contemplate future pregnancies.

The procedure consists essentially of passing two or more sutures through the isthmus of the uterus and fixing the latter as high up on the anterior abdominal wall as possible with non absorbable linen or silk suture material. It is important that the abdominal wall be firm. Hernias in the pouch of Douglas which are often mistaken for rectoceles are best treated by obliteration in the manner of Marion several sutures taken between the rectum and vagina via the abdominal route. These isthmus abdominal sutures are carried up through the peritoneum to include the posterior sheath of the rectus

fascia, as in Figure 1 and tied and the incision is closed in the usual fashion.

Of the 19 cases 1 was treated for retrodisplacement and sterility, 2 were treated for retroversion of the pregnant uterus 2 others for threatened miscarriage in retroverted uterus and the remainder for prolapse or retrodisplacement of the non pregnant uterus. Many of the latter also presented cystocele and rectocele which necessitated extensive vaginal plastic work in addition to the above mentioned procedure.

The results were reported as uniformly good throughout the entire 19 cases and in those patients who were pregnant or later became pregnant the pregnancy continued uninterrupted to term and terminated with normal delivery.

GEORGE C. FINOLA, M.D.

Baer J L, Reis R A and Laemle R M: Prolapse of the Uterus—Shifting Trends in Treatment. *Am J Obst & Gynec* 1937 34 617

In 121 operations for prolapse of the uterus the average age of the patient was forty six and two tenths years and the average parity was 3.8. Ninety one patients (41.1 per cent) were in the menopause and 33 patients (14.9 per cent) were sterilized. Seventeen patients (7.8 per cent) had a first-degree prolapse, 76 (35.2 per cent) had a second-degree prolapse and 123 (57 per cent) had a third-degree prolapse. Ten types of operations were employed. Based on the immediate and remote results three of these are well suited to meet particular indications, namely: the Watkins interposition operation, the Le Fort vaginal occlusion operation and the Mayo vaginal hysterectomy. The interposition operation should take precedence over vaginal hysterectomy whenever the conditions for its selection are encountered. Vaginal hysterectomy should be restricted to prolapse in which the pathology of the uterus itself carries the indication for hysterectomy.

The Le Fort vaginal occlusion operation is indicated for older women with atrophic genitalia in whom marital relations have terminated. For the childbearing group the choice lies between the Manchester operation and the Halban Forges operation for first degree and second-degree prolapse. The Gilliam suspension operation combined with vaginal reconstruction is best suited for third-degree prolapse.

There were 3 deaths (1.3 per cent). One was from lobar pneumonia, 1 from bronchopneumonia and 1 from pulmonary embolism.

End results were observed by personal examination after 127 operations (5.4 per cent). Of these 100 (78.7 per cent) were successful, 18 (14.2 per cent) were partially successful and 9 (7.1 per cent) were failures.

EDWARD L. CORVELL, M.D.

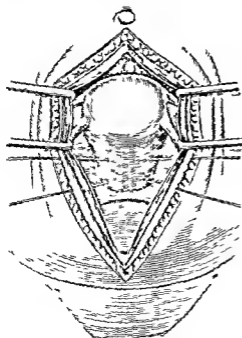


Fig. 1

of the patients seen in this series was either advanced or hopeless on admission. This is a reduction of 5 per cent in the total number of advanced cases.

Because of the long silent period of growth many cases will not be diagnosed until a late stage, unless more frequent pelvic examinations are made.

The dose of effective irradiation delivered to points 3 cm or more lateral to the cervical canal is inadequate to control the disease in 70 per cent of the cases.

Changes in technique are directed toward increasing the dose to the parametrium without the destruction of normal structures.

The prognosis is influenced by the clinical stage of the disease, the age of the patient, and the dosage of therapy given.

The importance of preliminary roentgen irradiation is stressed.

The important complications are pyometra (17 cases), fistulas (29), rectal stricture (9), and distant metastasis (12).

EDWARD L. CORNELL, M.D.

Annual Report on the Results of Radiotherapy in Cancer of the Uterine Cervix. Statements of Results Obtained in 1930 and Previous Years (Collated in 1936). *Acta obst et gynec Scand*, 1937, 17 Supp I

The committee appreciates that its first annual report to the Health Organization of the League of Nations must be somewhat of an experiment, but believes that it will serve as a guide in future work. The statements included in this report have emanated only from those clinics which were closely associated with the early work of this Radiological Subcommittee of the Cancer Commission of the League of Nations, however, these clinics invite collaboration by other institutes and individuals. For the present, the reports will be restricted to cancer of the cervix uteri, possibly, at a later date, analyses of carcinoma of the corpus uteri and of the vagina will be attempted.

In spite of continuous efforts to obtain uniform and comparable statistics on the results of radiological treatment of uterine cancer, some difficulties still remain. The essential ones are due to the small number of patients examined in some clinics, and the lack of similarity in the clinical material analyzed at various centers. For example, there is a tremendous variation in the proportion of early and late cancers at different clinics. In some countries, where hospital treatment is provided by the state, certain institutions are responsible for the treatment of almost every patient living in a given area. There is practically no selection of cases, and the only patients not treated are those who may be found unsuitable because of the extent of the disease, or because of the state of their general health. Such clinics may appropriately state the results of treatment by using the absolute-cure rate, i.e., the percentage of the total number of patients examined who are alive and free from recurrence after a stipulated number of years. The absolute-cure rate in one clinic is compa-

rable with that in another similarly circumstanced, but not with that of clinics in which there is a selection of cases. In order to meet this problem of the lack of comparability of clinical material, cases have been divided into stages according to the anatomical extent of the cancer. However, even the cure rates for the different stages of the disease are unreliable unless the rules for staging cancers are interpreted in a similar manner by all of the clinics submitting reports.

The following is the accepted definition of the various stages of cancer of the cervix uteri.

Stage I. The growth strictly limited to the cervix uteri, uterus mobilis.

Stage II. The lesion spreading into one or more fornices, with or without infiltration of the parametrium adjacent to the uterus, the uterus retaining some degree of mobility.

Stage III. (a) Nodular infiltration of the parametria on one or both sides, extending to the wall of the pelvis, with limited mobility of the uterus, or massive infiltration of one parametrium with fixation of the uterus, (b) more or less superficial infiltration of a large part of the vagina, with a mobile uterus; (c) isolated metastases in the pelvic glands, with a relatively small primary growth, (d) isolated metastases in the lower part of the vagina.

Stage IV. (a) Massive infiltration of both parametria extending to the walls of the pelvis, (b) carcinoma involving the bladder or rectum, (c) the whole vagina infiltrated (rigid vaginal passage), or one vaginal wall infiltrated along its whole length with fixation of the primary growth, (d) remote metastases.

There are some special notes for the guidance of collaborators in preparing reports.

The statement is to be restricted to cancer of the cervix uteri, including carcinoma of the stump. It should be confined to cases in which the treatment planned was entirely radiological, radium or roentgen-ray treatment. Patients operated on after failure of radiological treatment, and who were alive five years after the beginning of the treatment, should be included in the report.

Several clinical types of cases should be excluded, namely, cancer of the corpus uteri and vagina, recurrences after radical operation, cases treated radiologically elsewhere, and those primarily submitted to combined operative and radiological treatment. Only those cases in which the clinical diagnosis has been microscopically confirmed can, as a rule, be accepted. Precancerous conditions, chorionepithelioma, sarcoma, and malignant mixed tumors should be excluded.

The statement should deal with the total number of patients whose radiological treatment was begun during the year to which the statement refers, as well as with all patients who were examined with a view to treatment, but were not treated. The statement should not be completed until a five-year period of observation has intervened after treatment was started.

tion of that segment of the cervix to which are normally attached the cardinal and the uterosacral ligaments together with the sturdy pubocervical fascia ideal conditions are created for adaptation of the most dependable features of the several transposition operations and plication of the vesical sphincter is easily executed. Accurate identification on and dissection of the pubocervical fascia permits imbrication of this valuable unit beneath the bladder neck and urethra in accordance with the established principles of hernioplasty. Suture of the round ligaments into the angles of the cervical stump provides additional life and support, and adequate circulation to the cervical stump and attached structures is assured by preservation of the adjacent main trunks of the uterine vessels and their branches. The ureters are not endangered by any step of the operation and obliteration of the cul de sac and plication of the uterosacral ligaments for associated enterocele are readily effected. Finally reinforcement of the rectovaginal fascia together with reconstruction of the pelvic floor and perineum completes the operation with accurate restoration of normal anatomical relationships.

EDWARD L. CORNELL, M.D.

Payne F. L. The Clinical Significance of Endometrial Hyperplasia. *Am J Obst & Gynec* 1937 34 762

The clinical records of 534 patients with endometrial hyperplasia have been analyzed in the effort to determine its rôle in benign uterine hemorrhage, both before and after the menopause and to evaluate the significance of its association with myomas, endometriosis and fundal carcinomas.

The presence of hyperplasia usually implies abnormal bleeding but this is not a constant occurrence for such bleeding accompanied only 85 per cent of the premenopausal hyperplasias in this study. The remainder were attended by normal periods, oligomenorrhea or amenorrhea. When hyperplasia was found to be associated with other pelvic lesions the frequency of abnormal bleeding varied according to the type of complicating lesion. Of the patients with myomas and hyperplasia 80 per cent had irregular periods, against 70 per cent of those with ovarian cysts and 45 per cent of those with pelvic inflammatory disease. Such variation despite the constant presence of hyperplasia suggests that some influence other than the endometrial change precipitates the pathological bleeding. Further evidence that hyperplasia does not necessitate abnormal bleeding is the fact that one third of the patients with postmenopausal hyperplasia had experienced no bleeding since the menopause. Just as hyperplasia may occur without abnormal bleeding so may abnormal bleeding occur without hyperplasia. Approximately two thirds of the cases of functional uterine hemorrhage in this series yielded endometria which were devoid of hyperplasia.

The significance of the association between hyperplasia and benign pelvic lesions such as myomas

endometriosis, pelvic inflammatory disease and ovarian cysts, is uncertain. The theory that myomas and hyperplasia have a common etiological basis loses support from the occurrence of hyperplasia in only 17 per cent of the myomatous uteri in this study. If the two conditions are allied in origin, the 406 specimens of hyperplasia should have been accompanied by myomas more frequently than one out of three as was the case in this series. The absence of myomas in 65 per cent of the hyperplasias and the absence of hyperplasia in 83 per cent of the myomas suggest different origins for the two conditions.

The incidence of hyperplasia in association with endometriosis was the same as that found in pelvic inflammatory disease (10.9 per cent) while 43 per cent of the ovarian cysts were accompanied by hyperplasia. The author considers hyperplasia in these conditions to be the endometrial response to disturbed ovarian function and hopes that the unusually high incidence of hyperplasia in ovarian cysts will be explained by hormone studies of the cyst fluid.

The existence of a certain similarity between the microscopic appearance of marked hyperplasia and of fundal malignancy is generally conceded. While the stimulative processes which produce hyperplasia theoretically might continue until the endometrium assumes malignant characteristics the 24 per cent incidence of hyperplasia with superimposed carcinoma in this study indicates that if this excessive stimulation occurs it must do so with extreme rarity. It has been suggested that postmenopausal hyperplasia particularly favors the development of carcinoma. Its occurrence in this series five times more often than in the premenopause would seem to support this suggestion except for the fact that postmenopausal fundal carcinoma is generally conceded to be from three to four times as common as premenopausal regardless of the type of the associated endometrium. The significance of the association between hyperplasia and fundal malignancy seems to be more in the danger that the hyperplasia may so dominate the pathological picture as to obscure the malignant change than in the likelihood that it will favor the development of carcinoma.

EDWARD L. CORNELL, M.D.

Healy W. P. and Frazer E. L. Methods and Results of Treatment in Carcinoma of the Cervix at the Memorial Hospital. *Am J Obst & Gynec* 1937 34 593

Five hundred and fifty-one cases of histologically proved primary carcinoma of the cervix treated at the Memorial Hospital during the years from 1911 to 1931 inclusive were used as a basis for this statistical study. An analysis of these cases reveals the following facts:

The salvage as measured by the five-year survival rate is increasing but is still far from satisfactory.

Further improvement of these results is dependent upon earlier diagnosis. The condition of 70 per cent

rabbits and monkeys (*Macacus rhesus*) the fallopian tubes as well as the ovaries move of their own accord by action of smooth musculature embedded in their ligaments. Upon ovulation within these animals the infundibulum of the tube was seen to pass across the ovary. The ovary was observed to turn to and fro on a longitudinal axis, and allow its various surfaces to face the tubal ostium. The fimbriae were distended and spread out over the surface of the ovary. The conclusion is that the ovum never enters either an ovarian bursa or the general peritoneal cavity, but is directly transferred to the fallopian tube.

In the study herein reviewed these conditions have been observed in man. The author presents in review observations made by earlier writers as well as a discussion of the anatomy of the adnexa, particularly with reference to the presence of smooth muscle fibers within the ligamentous structures about the ovary. In the past investigators have drawn conclusions regarding ovular transit from observations of the position of the human adnexa as found at the time of operation. Such observations give only a picture of the temporary position found at that time but do not give a definite idea of what movements the organs may be capable of. There can be no doubt that the tube can change its position very quickly. Knowing this to be true, the conclusion is reached that this change is due to muscular activity in the organ itself. The possibility of the human ovary having its own power of mobility has never been discussed previously.

The author reports 3 cases where this action of the human ovary was observed and describes it in detail. By the same technique he has studied 6 other cases. In 4 of these it was possible to prove ovarian movement of the same type as in the 3 first mentioned. In 2 of the cases, however, the ovary remained immobile during the examination.

In order to demonstrate the function of muscle fibers in the ligamentum suspensorium ovarii, small drops of lipiodol were injected during laparotomies beneath the tunica albuginea. With these indicators the position of the ovary in the pelvis was observed during subsequent radiographical examinations. When uterosalpingography was simultaneously carried out, the anatomical relation of the ovary and tube could be shown.

Serial photographs taken under these conditions showed that the ovary possesses mobility. By the various movements of the ligamentous musculature it is able to move in a superior and an inferior, as well as a longitudinal and medial direction. Rotation of the ovary may take place on an axis parallel with its

longitudinal axis. Finally, it was shown that the tube could curve around the ovary in a bow-shaped manner.

The author contends that on account of this mobility on the part of the tube and ovary, the infundibulum at the time of ovulation can be placed in direct contact with the ovary, which through rotary movements has the power of turning its various surfaces toward the ostium of the tube. Under such conditions the ovum undoubtedly never enters the general abdominal cavity but is transferred from the ruptured follicle directly to the fallopian tube.

In his discussion the author points out that it has been established by many observers that the ova from the ovary of one side may be brought across to the tube on the other. Under such circumstances it must be assumed that other arrangements exist for safeguarding the transit of the ovum.

HERBERT F. THURSTON, M.D.

Rock, J., Reboul, J., and Wiggers, H. C.: *The Detection and Measurement of the Electrical Concomitant of Human Ovulation by Use of the Vacuum-Tube Potentiometer.* *New England J. M.*, 1937, 217, 654.

On the basis of similar observations on the rabbit, the authors report on two patients in whom the exact time of ovulation was detected by electrical measurements and confirmed by operation. They cite a confirmation of their studies by a third case recently reported. The time of ovulation is detected by measuring the difference in electrical potential between a vaginal and abdominal lead. During ovulation the vaginal lead attached to the grid of a vacuum-tube potentiometer becomes increasingly negative. At the height of ovulation a difference of 7 or 8 millivolts between the abdominal and vaginal lead is registered. At other times the difference between these two leads rarely exceeds 2 millivolts.

One case report is given in detail, with the technique of applying the electrodes. Patients with fairly normal menses, between the ages of twenty-five and thirty-five, and whose condition does not interfere with ovarian behavior, are selected from those recommended for laparotomy. The time of likely ovulation is calculated and the test is carried out during this period.

A constant differential of about 2 millivolts was maintained before ovulation, with a general increase to 7.7 millivolts at the time of ovulation, and a decrease in a few hours to the former level. Laparotomy performed fourteen hours after ovulation disclosed a freshly ruptured follicle, which is described.

T. FLOYD BELL, M.D.

Ten tables are provided in which the collaborators are to make their reports. Table I deals with the total number of cases examined and a separation of such cases into two groups those not treated and those which were submitted to radiological treatment. Table II classifies the cases which were examined but not treated, and presents a list of reasons for failure to treat them. Table III groups the cases into stages and separates them into those with and without microscopic confirmation of the clinical diagnosis. Table IV gives the results of treatment estimated after a period of observation of five years from the beginning of treatment. Table V gives the absolute cure rate. Table VI gives the relative cure rate, this depending on the stage of the lesion at the initial examination. Tables VII to X inclusive have to do with the compilation of data from cases treated prior to 1930.

This report is concluded with statements from six centers, namely: Le Centre des Tumeurs de l'Université de Bruxelles, Belgium; The Liverpool Radium Institute, England; The Marie Curie Hospital, London, England; Radium Centre for Carcinoma, London County Council, England; L'Institut du Radium de l'Université de Paris, France; The Radiumhemmet, Stockholm, Sweden.

GEORGE H. GARDNER, M.D.

EXTERNAL GENITALIA

Zocchi S. Fibromyomas of the Vagina (I fibromioma della vagina). *Ginecologia* Torino 1937 3 708

The author gives a general review of the subject of fibromyomas of the vagina and adds a bibliography and a case report.

The patient, thirty six years old, was admitted to the hospital for a perineorrhaphy and at operation a tumor the size of a nut was found in the posterior vaginal wall. The diagnosis of fibromyoma was confirmed by microscopic examination. The muscle bundles of the tumor were continuous with the muscular layer of the vagina.

Zocchi believes that the majority of these growths arise from the vaginal wall. M. E. MORSE, M.D.

MISCELLANEOUS

Gunn D. L., Jenkin P. M. and Gunn A. L. Menstrual Periodicity: Statistical Observations on a Large Sample of Normal Cases. *J. Obst. & Gynec. Brit. Emp.* 1937 44 839

Menstrual data have been collected from normal women by a postal method in which tests of reliability were possible. The 770 women who provided the data were divided into three groups: (a) reliable cases, (b) fairly reliable cases, and (c) unreliable cases. There were 209 reliable, 470 fairly reliable, and 291 unreliable cases.

It was found that 90 per cent of the women had an average interval between the onset of successive menstruations of between twenty five and thirty six

days inclusive, 3 per cent had an average of thirty seven days or over, and 7 per cent an average of less than twenty five days. In only about 2 per cent of the women was the interval less than twenty four days. The average interval did not show any predilection for whole weeks. The average periodicity for all 479 cases in group (a) and (b) was 90 ± 0.10 days; the commonest averages lay between 26 and 29 days. No cases were found which did not vary by at least 2.75 days between the shortest interval and the longest. The typical difference between the shortest and the longest interval was eight or nine days. The difference was six days or more in 84 per cent of the women, and over thirteen days in 30 per cent of them. The lowest mean deviation of the separate intervals from the individual average was ± 0.6 days. About half of the women had mean deviations of ± 1 day or less, and the other half ± 2 days or more. In 5 per cent of the women the mean deviation was over one week. The term "regular" has no precise meaning in connection with menstruation.

The duration of one interval is not influenced by the duration of its predecessor. Among the professional classes a correlation between occupation and average interval was absent. Marriage did not appear to affect the periodicity. There was a progressive decrease in the average interval with increasing age, amounting to one day in five or six years. There was no tendency for the interval to vary with the seasons of the year. There appeared to be a slight tendency for menstruation to start in the latter part of the working week. No connection whatsoever could be detected between menstruation and the moon in the data on over 10,000 menstruations. The approximate coincidences which are so well known, appear to be fortuitous.

In the light of the authors' results on the variability of the menstrual interval, it is clear that the sole period method of contraception is not wholly satisfactory for everyone as a sole method. It should be of great value in some cases and of some value in most cases. In any woman an unusually early or late menstruation quite normally correlated with ovulation may occur at any time and a single such occurrence may result in undesired pregnancy. On the other hand if pregnancy is desired with the minimum of sexual intercourse or in the minimal number of months, concentration on the days surrounding the usual time of ovulation is a useful method of accomplishing this purpose. In any case, predictions cannot be made without an accurate series of menstrual records, preferably covering at least a year, and the authors' results show that conclusions from any records should be amended from time to time as the age of the subject increases. CHARLES BIRCH, M.D.

Westman A. Investigations into the Transit of Ova in Man. *J. Obst. & Gynec. Brit. Emp.*, 1937 44 821

In his studies made prior to those reported here with the author was able to show definitely that in

Genital infection during labor occurred twice as often in cases of premature and early rupture of the membranes as it occurred in cases of late rupture.

The number of forceps deliveries was increased in cases of both premature and early rupture of the membranes in the primipara. In the multipara, the number of forceps deliveries was the same in both premature and late ruptures.

There was no increase of fetal mortality when premature rupture of the membranes occurred. However, in cases of early rupture of the membranes the fetal mortality was higher than in the other groups.

The number of interventions and infections were not increased in the cases of early rupture as compared with those of premature rupture, in spite of the longer labors in the former.

More effective pains may be the cause of the shorter time of delivery noted in patients with rupture of the membranes before or simultaneously with the onset of pains. However, the dilatability of the cervix or, to express it differently, its power of resistance, may be the cause. Both factors must be considered, but it is impossible to ascertain which of these is of more importance.

The artificial rupture of the membranes early during labor should be distinctly avoided, except at definite indication.

T FLOYD BELL, M D

Reichenmiller, H : Evaluation of the Lateral Pelvic Roentgen Exposure in the Conduct of Labor (Die Auswertung der Beckenseitenaufnahme fuer die Geburtsleitung) *Muenchen med Wchnschr*, 1937, 2 1254

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Valuable data as regards the posture, presentation, and configuration of the skull are made available by the lateral pelvic exposure, and under certain conditions, even its width. The method is of particular value in the presence of contracted pelvis, since by its use the dangers of vaginal examination may be avoided. The usual methods of clinical examination should not be neglected, roentgenography being resorted to only when it is absolutely necessary.

(SCHUBERT) JOHN W. BRENNAN, M D

PUERPERIUM AND ITS COMPLICATIONS

Gibberd, G. F.: Prontosil in Puerperal Hemolytic Streptococcus Infections *Brit. M J.*, 1937, 2. 695

The introduction of the new aniline derivatives at the isolation block of the Queen Charlotte's Hospital since 1936 has resulted in (1) a considerable fall in the mortality rate, from 20 to 4.5 per cent, (2) a reduction in the proportion of cases in which the infection spread beyond the limits of the birth canal, and the relatively infrequent development of an inflammatory mass after treatment had been instituted; (3) a significant fall in the mortality rate in cases of proved septicemia, associated with a relative decrease in the proportion of severe cases of septicemia, and a fall in the incidence of septicemia developing after the treatment had been instituted, and (4) the relatively infrequent development of generalized peritonitis as shown by post-mortem examination.

An analysis of the causes of the decrease in the mortality rate shows that the decrease is associated mainly with a decrease in the widespread invasion of tissues by the hemolytic streptococcus, rather than with a greater tendency to resolution of the disease after widespread invasion of tissues has occurred. This feature makes it necessary to consider whether the improvement since January, 1936, is due to the efficacy of the treatment or to a change in the virulence of the prevalent organism. It is possible that both factors may be concerned. In non-fatal cases in which tissues beyond the limits of the birth canal have been invaded by the hemolytic streptococcus, there is some clinical evidence that the new drugs hasten the resolution of the inflammatory process, and this is a good reason for believing that the treatment, rather than the change in the virulence of the organism, is responsible for the improvement.

CHARLES BARON, M D

NEWBORN

Wilson, R. A., Torrey, M. A., and Johnson, K. S.: The Initiation of Respiration in Asphyxia Neonatorum. A Clinical and Experimental Study Incorporating Fetal Blood Analyses and a Consideration of Important Methods of Resuscitation. *Proc Roy Soc Med*, Lond., 1937, 30 1461

Experience demonstrates that most drugs which are administered to the mother pass also to the

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Forlini E. Modifications in the Epiphysis Cerebralis during Pregnancy (*Sulle modificazioni della epiphysis cerebri della donna gravida*). *Riv. ital. di ginec.* 1937 20 289

The function of the pineal gland is not yet understood. In fact there are many who believe it has no function. The author presents a review of the literature to illustrate the discrepancies in the present beliefs. Even the limited studies of the epiphysis and its changes in pregnancy have led to contradictory conclusions.

Forlini reports the study of 66 specimens of pineal glands removed at autopsy from women dying in various stages of pregnancy. He also studied 50 specimens removed at autopsy from women who had died from other diseases.

The normal weight of the pineal gland with or without pregnancy varied from 120 mgm. to 180 mgm. Those which were heavier contained either concretions or cysts. The heaviest gland weighed 450 mgm. the lightest 40 mgm. The average weight in pregnancy was 139.5 mgm. and in the absence of pregnancy 136.7 mgm. This slight average difference of 27 mgm. may be related to the slightly greater percentage of water in the tissues during pregnancy.

The author's study of the microscopic anatomy of these specimens revealed certain common histological characteristics. These changes were not present in all the glands. In some sections the solid arrangement of cells predominated; in others there was an alveolar arrangement with intervening strands of glia tissue. In many sections there were areas of gliosis, some in solid plaques, others with central degenerative changes and cyst formation. These changes were noted with equal frequency in the pineal glands during the pregnant and non-pregnant state. There may possibly have been a more common transformation of solid plaques to cysts during the pregnant state.

The changes in the cytoplasm appeared more constant than any other single characteristic, yet the author believes that no single change was sufficiently great to be of functional importance. The cytoplasm seemed to be increased in relative volume. Processes of cytoplasm were quite common. Palisade formation, not unlike that seen in perithelioma, was noted in many specimens, while in others definite papillary formations were apparent. These changes were not limited to the pregnant state of the gland.

In the perivascular tissues the author noted many mast cells, lymphocytes, plasma cells and brown pigment cells. These were about equal in all the specimens. There seemed to be a preponderance of lipid-containing cells in the glands of pregnant women. This may be related to the hypercholesterinemia of pregnancy.

The epiphyses of 10 women who died from eclampsia were no different from the others.

The author believes that the pineal gland is not necessary for the normal course of pregnancy. The gland probably is a portion of the nervous system which is undergoing evolutionary retrogression and in its present state has either a markedly reduced function or no function whatsoever. A possible relationship between this gland and the calcium metabolism of the body is mentioned.

A. LOYIS POST, M.D.

LABOR AND ITS COMPLICATIONS

Fredrikson H. The Effect on Deliveries of the Spontaneous Rupture of the Membranes. *Acta obst. et gynec. Scand.* 1937, 17 309

This contribution is based on a study of patients seen at the General Living In Hospital in Stockholm in the period from January 1 to April 30 1936. It comprises 1,293 primiparas and 1,305 multiparas with normal occipito-anterior presentation in whom the weight of the child was more than 3,500 gm. All ruptures of the membranes occurring before or simultaneously with the onset of the pains were considered premature ruptures; all ruptures of the membranes which occurred after the onset of the pains but before the external os uteri had been dilated to more than three fingers' width were counted as early ruptures; all others were considered as late ruptures.

The slightly more frequent occurrence of premature rupture of the membranes in primiparas than in multiparas is not statistically significant.

Rupture of the membranes occurred before the onset of pains in 12 per cent of the primiparas and in 10.7 per cent of the multiparas. Rupture of the membranes occurred simultaneously with the onset of pains in 7.8 per cent of the primiparas and in 5.7 per cent of the multiparas.

The duration of labor was shortened considerably following premature rupture of the membranes both in primiparas and in multiparas.

The duration of labor in primiparas with early rupture of the membranes was considerably longer than that in other groups. At late rupture of the membranes the duration of labor was within normal limits or less in half of the cases.

In primiparas the figures seem to justify the conclusion that premature and early rupture of the membranes occurs somewhat more frequently in the higher age groups.

In the different groups of primiparas the weight of the child offered no conclusion as to the effect of the weight of the fetus on the rupture of membranes.

In primiparas in whom the pains occurred after the membranes had ruptured it was noted that the pains had begun within the first five hours in as many as two thirds of the patients.

Genital infection during labor occurred twice as often in cases of premature and early rupture of the membranes as it occurred in cases of late rupture.

The number of forceps deliveries was increased in cases of both premature and early rupture of the membranes in the primipara. In the multipara, the number of forceps deliveries was the same in both premature and late ruptures.

There was no increase of fetal mortality when premature rupture of the membranes occurred. However, in cases of early rupture of the membranes the fetal mortality was higher than in the other groups.

The number of interventions and infections were not increased in the cases of early rupture as compared with those of premature rupture, in spite of the longer labors in the former.

More effective pains may be the cause of the shorter time of delivery noted in patients with rupture of the membranes before or simultaneously with the onset of pains. However, the dilatability of the cervix or, to express it differently, its power of resistance, may be the cause. Both factors must be considered, but it is impossible to ascertain which of these is of more importance.

The artificial rupture of the membranes early during labor should be distinctly avoided, except at definite indication.

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Experience demonstrates that most drugs which are administered to the mother pass also to the

child. Consequently, the decrease of sensitivity in the mother is accompanied by a decrease in the sensitivity of the child to those chemical stimuli that normally induce and maintain respiration. As an approximation the amount of protection against pain in relation to the depression of respiration from drugs and gases in common use (paraldehyde or trouts oxide ethylene ether chloroform barbiturates scopalamine morphine and morphine) is as follows:

When morphine is used it should be used in moderate dosage and should not be administered later than two hours before delivery. It has been found experimentally and by clinical experience that babies are not easily depressed by the barbiturates, but that if deep depression exists as the result of excessive dosage the response if any, to the administration of carbon dioxide is poor. Ether is relatively safe unless it has been present in the blood in high concentration for a long period of time. Nitrous oxide is of little danger to the baby if 15 per cent or more of oxygen is administered with it. If the oxygen ratio is much below this however asphyxiation of both mother and baby will occur. The value of paraldehyde is becoming generally recognized. There is no other available drug so harmless.

Artificial respiration in asphyxia neonatorum is condemned for its futility exposure to cold and the risk of injury. The peripheral stimuli which are incidentally involved in the various methods, are quite useless because they do not reach the center. The necessary stimuli must be chemical rather than physical.

In the hands of the novice mouth-to-mouth insufflation is always dangerous and even after long experience the possibility of ruptured alveoli and infection is great. Occasionally a baby is saved by its use. It should be reserved as a last resort after all other methods have failed.

As a result of the authors' experiments they can positively state that although the bronchial tree can be thoroughly distended the chest walls expanded and the diaphragm displaced the lung tissue itself cannot be adequately aerated even by pressures high enough to be injurious and destructive. The Drinker respirator as it is employed today, has little if any place in the initiation of respiration in the newborn. At times resuscitators appear to give results in cases for which they are not needed. In the serious cases under consideration they usually fail, and they are always contra indicated if suction is employed for if it acts at all it tends to deflate the lungs and restore them to atelectasis. The inhalator is the best and safest means we have for saving the life of the asphyxiated but breathing baby. It is also of value as a neonatal treatment for the prevention of atelectasis and pneumonia. It is of no avail in itself, however as a means of initiating respiration. Intubation is safe and easy to accomplish in the severely asphyxiated baby as it permits of thorough aspiration and provides an excellent airway. Essentially it is the extension of an inhalator into the

lungs. It should not be used in an attempt to open the alveoli by direct attack.

As the result of hundreds of animal experiments in different types and degrees of narcosis and asphyxia only two drugs were found to be good respiratory stimulants for intravenous resuscitation: pyridine B carbonic acid diethylamide (coramine) and lobeline hydrochloride. The former increased the rate and amplitude of respiratory movements considerably. On a number of occasions it initiated respiration after the experimental production of apnea. However frequently severe and sometimes fatal convulsions occurred even when recommended doses were used.

Lobeline will heighten the respiratory efficiency of the normally breathing baby. If it will rapidly overcome respiratory depression due to morphine it will produce such a marked expansion of the thoracic cavity as to greatly diminish if not entirely overcome residual atelectasis. Lastly, it will actually initiate respiration in severe asphyxia. The graphs of the latter condition are furnished by detailed protocols of the resuscitation of 10 babies with asphyxia pallida and by concomitant fetal blood studies. The drug must be introduced directly into the blood stream, which is a most rapid method of reaching the center. Grains of one twentieth of the hydrochloride are injected into the umbilical vein. The authors have injected lobeline hydrochloride into the circulation of 340 babies.

Intravenous resuscitation appears to be of only limited use for the poorly breathing baby but is of great importance for the stillborn. Its role is almost exclusively that of initiation. Two highly desirable aims, namely, an increase of body tonus and a favorable influence on the respiratory center have been satisfactorily achieved by lobeline hydrochloride which has been found to be safe and free from accompanying effects. Important advantages of its use are economy simplicity and rapidity of action. Disadvantages are the transient nature of the response and the necessity for perfect asepsis.

CHARLES BARON, M.D.

MISCELLANEOUS

Benito J. V. Histological Interpretation of Chorionepithelioma (El corioepitelioma Su interpretación histológica) *Semana médica* 1937 44 2440

The author is of the opinion that the histopathological interpretation of chorionepithelioma presents difficulties which are not encountered in any other type of neoplasm.

Benito has used for his study the gynecological material of the Hospital Español in Rosario. In reviewing a large number of cases he found that a placental residue retained in the uterine cavity may undergo the following changes:

1. As a rule the tissue undergoes retrogressive changes without assuming malignant character. Such a tissue is called a placutoma or placental in

clusion On microscopic examination one encounters nests of large, rounded, polygonal or oval cells with a finely reticulated cytoplasm The large nucleus is placed centrally and it has a normal affinity for stain There is no evidence of caryocinetic activity in the chromatin network As time goes on, these cellular elements undergo either mucoid or hyaline degeneration, may become calcified or, at times, may even assume an infiltrating character although the lesion remains benign

2 The cellular elements composing the tissue may assume a proliferative, infiltrative, and highly malignant character Metastases are rapidly formed

Under normal conditions chorionic tissue is made up essentially of two layers of cells an outer layer composed of syncytial cells presenting round or oval nuclei and distributed irregularly within a homogeneous band of protoplasm, and a layer of large and well delimited cells which have been named Langhans' cells

The aforementioned types of cells are the only two cellular elements present which, when proliferating atypically, may suggest the presence of a chorionepithelioma

In malignancies the cellular elements of the internal layer begin to proliferate They assume a polygonal outline because of mutual crowding Each cell contains a large nucleus usually placed centrally and a homogeneous cytoplasm

The cells of the external layer also begin to proliferate Their degree of polymorphism is, roughly speaking, directly proportional to the degree of malignancy of the lesion

In comparing sections taken from neoplastic tissue, endometrium, myometrium, myometrial capillaries, and from metastases, the author encountered the same types of malignant cells presenting the same histological features, such as polymorphism and disorderly arrangement of the individual cellular elements

The diagnosis of malignancy is usually made from the aforementioned criteria supplemented by signs of caryocinetic activity in the nuclei, intense proliferation, and infiltrative power independent of the site of occurrence in the various organs as well as location within the organ

In the laboratory a chorionepithelioma should always be suspected whenever chorionic cells present an atypical histological appearance In suspected cases, the Aschheim-Zondek or any other biological test proving the presence of live chorionic tissue should be performed to confirm the diagnosis

RICHARD E SOMMA, M D

Wood Walter, J, and Aguilar Pavez, G.: Chorionepithelioma of the Fallopian Tube with Extension into the Pelvic Cavity (Corionepithelioma de la trompa con propagación hacia la cavidad pelviana) *Bol Soc chilena de obst y ginec*, 1936, 2 54

The author presents the case of a twenty-five-year-old woman with a history of dyspareunia and a

criminal abortion which was performed six months before Otherwise she had always been in good health She came to the clinic with the complaint of menorrhagia and metrorrhagia of several months' duration, and a dull pain localized in the right adnexal region accompanied by a tumefaction of the lower abdomen and marked loss of weight.

On examination, the nipple and areolar region of both breasts were found to be deeply pigmented In the abdomen there was found, in the region of the hypogastrium extending to the level of the umbilicus, a hard painless mass of round shape and smooth consistency The ample vagina gave a velvety feel to the palpating finger and the vaginal vault was entirely occupied by a fluctuating mass extending into the right lateral fornix The uterine body and the adnexa were difficult to outline on bimanual examination

On the basis of these findings a tentative diagnosis of ectopic pregnancy was made

Friedman's and Hofmann's tests were positive, which showed the presence of living chorionic tissue

About one week later the patient was operated upon and a bilateral salpingo-oophorectomy was performed After the peritoneum had been opened, a mass was found occupying the major part of the pelvis This mass was adherent to the intestine and was peeled off with great difficulty It was intimately related to the right adnexa On this side neither the tube nor the ovary was identified

Macroscopically the lesion had the appearance of an organized hematocele, but malignant degeneration was suspected The left tube was found to be normal, but the left ovary was transformed into a large tumor containing multiple cysts as they may often be seen in some cases of chorionepithelioma

The postoperative course was stormy, the patient became more cachectic, a stercoraceous fistula was formed, and she died twenty-nine days following the intervention

On autopsy the tumor was found to occupy the entire cul-de-sac and pelvis minor According to the author the site of this chorionepithelioma is unusual and he believes that the tumor had originated from the fallopian tube and had rapidly invaded the entire pelvic cavity

Microscopic examination of the tissue revealed the presence of syncytial cells and confirmed the diagnosis of chorionepithelioma made on biopsy.

The authors also believe this lesion to have been a complication of an original ectopic pregnancy which had been disturbed by the manipulations of the criminal abortion sustained six months before.

After briefly reviewing the literature on this subject, the authors present some of the clinical aspects of chorionepithelioma RICHARD E SOMMA, M D

Matteace, F.: A Diagnostic Error in a Case of Vesicular Mole (Errore diagnostico in tema di mola vescicolare) *Clin ostet*, 1937, 39 327

Matteace reports the case of a thirty-year-old woman who had been married for fifteen months

before admission and whose past history was essentially negative. Shortly before admission to the clinic she had been operated upon for a vaginal septum which made coitus difficult.

When seen at the clinic she complained of metrorrhagia of about one month's duration. This was accompanied by a moderate elevation of the temperature. She also noticed a gradual increased fatigability, dyspnea and a sense of tumefaction in the abdomen. This was followed by vomiting and a further elevation of the temperature.

Physical examination revealed the presence of a round, smooth mass in the abdominal cavity extending from the pelvis upward to the level of the umbilicus. The thorax revealed bilateral dullness at the pulmonary bases extending on the left side up to the angle of the scapula.

The heart was found to be enlarged and the second aortic sound was accentuated. The blood pressure was from 188 to 195 and the pulse rate 170 per minute. There was an albuminuria and casts were present in the urine.

Vaginal examination revealed an enlarged uterus and the presence of a cystic mass occupying Douglas pouch. A tentative diagnosis of ovarian tumor was made.

Inasmuch as the metrorrhagia continued and gave rise to a marked secondary anemia and inasmuch as reexamination revealed the presence of a boggy tissue within the cervical canal the patient was operated upon. A subtotal hysterectomy and bilateral oophorectomy were performed.

The postoperative course was stormy at first but on the fifteenth day the patient's condition improved. Friedman's test however remained positive.

Suddenly a bilateral pleurisy developed and a thoracentesis was performed which yielded a serosanguineous material on both sides.

Gradually the symptoms disappeared and the patient made an uneventful recovery. After one month Friedman's test was negative and further tests remained negative.

The uterus removed at operation weighed 2600 gm and measured 30 cm in length and 25 cm in width. The internal surfaces were covered by a vesicular mole which occupied the entire uterine cavity. The mole was implanted on the anterior surface of the uterus. The villi were found to extend deeply into the uterine musculature. The pathological diagnosis was an infiltrating vesicular mole probably of highly malignant character.

The ovaries were found to be very large and puckered. They weighed 450 gm and their peduncles were twisted. On sectioning numerous cysts were found which contained a whitish yellow bloody or gelatinous fluid.

Examination of the villi revealed a marked proliferation of Langhans cells. The chorionic tissue was found to infiltrate the uterine musculature.

The author states that cystic degeneration of the ovarian follicles is a common finding in molar pregnancies probably because of the pathological activity of the villi and the enormous quantities of hormone elaborated by the latter.

The diagnostic error made in this case consisted in the fact that a pregnancy was not diagnosed at the time the patient entered the clinic. Therefore the author emphasizes the importance of performing an Aschheim Zondek test for a correct diagnosis. Vesicular moles and chorionepithelioma will give a positive reaction.

RICHARD I. SOUZA, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Higgins, G. C., and Tormey, T. W., Jr : Aberrant Renal Vessels *Internat Clin*, 1937, 4 : 149

Anomalous renal vessels as the cause of linked ureter were first described by Boogard in 1857. In this country Mayo, Braasch, Kelly, and Harris during the past twenty-five years reported numerous cases. The incidence is generally more common in the female, but in the authors' series it was slightly more common in the male. The pathological changes in the kidney occur in early adult life and usually give rise to symptoms which occur before the fortieth year.

An embryological relationship is undeniable, the anomalous condition occurring in 20 per cent of all people. The obstruction to the ureter may be caused by a movable kidney, dilated pelvis of the kidney, or interference with normal peristalsis of the ureter. Regardless of the cause, the obstruction leads to hydronephrosis.

The symptoms are pain and discomfort on the affected side. Reflex gastro-intestinal symptoms may lead to abdominal section unless the kidney



Fig 1 Pyelogram showing a large hydronephrosis of the right kidney (Courtesy of J. B. Lippincott Co.)



Fig 2 Ureterogram showing obstruction of the left ureter at the ureteropelvic junction (Courtesy of J. B. Lippincott Co.)

has become infected and chills and fever suggest further examination of the genito-urinary system.

The diagnosis should be comparatively easy if the condition is suspected, the history, cystoscopy, and radiography are of diagnostic value.

The successful treatment depends on surgery, either plastic surgery, ligation of the aberrant vessels, or removal of the kidney. *ELMER HESS, M.D.*

Mathé, C. P. : The Diagnosis and Treatment of Perinephritic Abscess. Renal Fixation, a New Roentgenographic Diagnostic Sign. *Am J Surg*, 1937, 38 : 35

The author describes a new diagnostic roentgenographic sign of special value in the diagnosis of those cases of perinephritic abscess presenting difficulty.

Supportive perinephritis is classified as follows:
1 The primary metastatic type which is independent of kidney lesions or those of neighboring thoracic or abdominal organs, and may be hematogenous, toxic, or traumatic.

2 Perinephritic abscess following renal lesions.

3 Paranephritic abscess secondary to extraneous lesions.

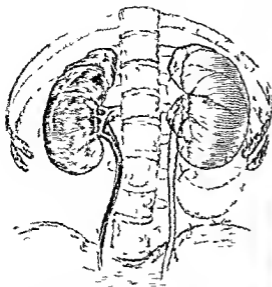


Fig. 1 Schematic illustration demonstrating renal fixation the author's new positive roentgenographic sign for the diagnosis of perinephritic abscess. In making the standing retrograde or intravenous pyelogram one notes lack of normal renal mobility as demonstrated on the right side. On the left side one sees usual descent of the kidney varying from 2 to 10 cm. in the different positions in which it is usually situated (Courtesy of Am J Surg)

In the diagnosis of perinephritic suppuration the new roentgenographic sign consists of renal fixation evidenced by making retrograde or intravenous pyelograms in the standing position. It is essential that the compression band used in taking films with the Potter-Buckley diaphragm be released when the patient is put in the standing posture.

Other corroborative roentgenographic signs consist of obscuration of the psoas muscle and kidney outline displacement of the kidney and ureter revealed by stereoscopic films; an opaque shadow cast by the abscess curvature of the spine; displacement of the colon; fluoroscopic evidence of disturbance of respiratory synchronism and the presence of a wave in the abscess cavity. The treatment of perinephritic abscess consists of prophylactic measures instituted to relieve infectious processes of the skin, bone, prostate gland and throat to prevent invasion of the blood stream. In the surgical treatment exposure should be sufficient to permit search for pockets and the examination of the kidney for cortical lesions.

ANDREW McNALLY M D

Harris A. Ureteral Anomalies with Special Reference to Unilateral Duplication with One Branch Ending Blindly. *J Urol* 1937 38 442

Anomalies of the ureter are of interest because of the obstructive and infective lesions resulting from



Fig. 2 Vertical pyelogram demonstrating author's new roentgenographic sign consisting of renal fixation (Courtesy of Am J Surg)

them and because of their surgical importance to the urologist. Embryological defects elsewhere in the patient should suggest them. Obscure pyurias of children should also suggest such defects.

Duplication of the ureter with one branch ending blindly a distinct clinical entity as reported by Kretschmer in 1933 is one of the rarest of all anomalies. These cases may and have been reported erroneously as diverticulum of the ureter.

This type of duplication may obstruct the normal ureter by acting as a lateral hydrostatic pressure.

The author is not in agreement with Campbell that the lesion is important only when the ureter ends blindly below. He reports cases which show that the blind branch above caused obstruction.

The possibility of unusual anomalies must constantly be borne in mind during cystoscopic examinations and every diagnostic aid utilized when the diagnosis is in question.

CAMER HESS M D

Foley F E B. A New Plastic Operation for Stricture at the Ureteropelvic Junction. *J Urol* 1937 38 643

The author believes that obstruction at the ureteropelvic junction is the sole cause of pure hydrone

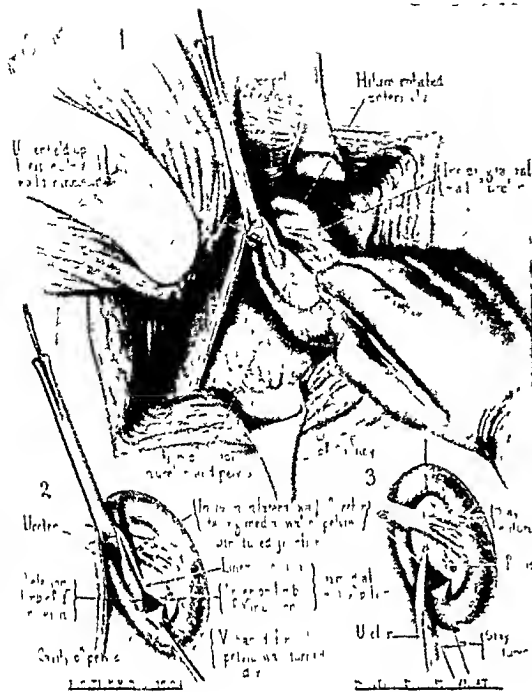


Fig 1

Foley Y plasty for ureteropelvic junction stricture

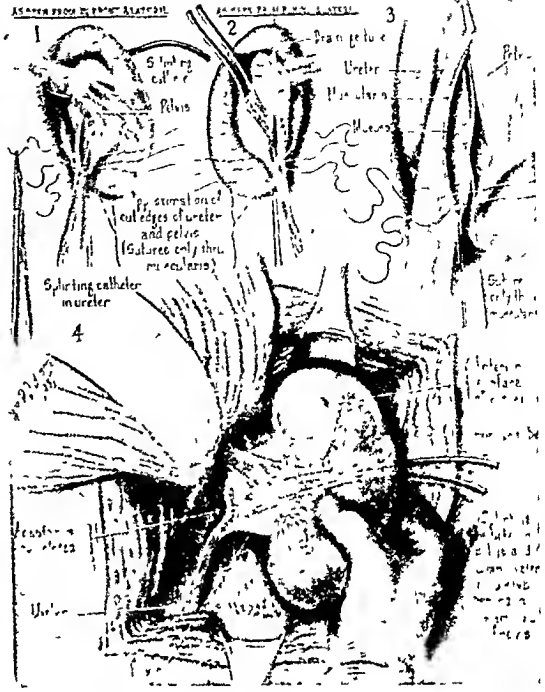


Fig 2

phrosis and urges a better investigation and understanding of the pathology present together with conservative methods of treatment. He cites as determining factors in favor of conservatism (1) the ability to relieve obstruction, (2) the presence of potential function capable of sustaining life, (3) non-prohibitive risk attaching to the operation, and (4) absence of the opposite kidney or severe impairment of its function. He presents an illustrative history of plastic operations for such obstruction and points out their surgical value.

The chief faults of the described operations are that they produce one or more of the following conditions: undesirable puckering or folding at the suture line, persistence of the high insertion of the ureter, and absence of gradual funneling of the pelvis into the ureter. The author's incision in the pelvis and ureter is similar to the Schwyzcr incision except that it is continued farther along the wall of the pelvis adjacent to the ureter and his closure approximates the cut edges of the continuous incision by a method which prevents the afore-mentioned conditions. He advocates pyelography in the oblique position, careful evaluation of functional tests, and careful interpretations of the ureteropyelograms with regard to the renal, pelvic, and ureteral physiology.

The article is supplemented by 20 case reports with photographs of the ureteropyelograms of

these cases. In analyzing his results, the author believes he has satisfied the following criteria of cure: (1) relief from pain and other symptoms, (2) improvement of function, (3) disappearance of infection, and (4) disappearance of dilatation.

DONALD K. HIBBS, M.D.

Vermooten, V. Bilharziasis of the Ureter and Its Pathognomonic Roentgenographic Appearance. *J. Urol.*, 1937, 38, 430.

Human bilharziasis is caused by one or more of the three forms of blood flukes, the schistosoma hematobium, mansoni, and japonicum. The parasite selects the urinary tract primarily for depositing its eggs. When the eggs are voided they come in contact with water, gradually swell, rupture, and liberate a miracidium. This becomes a sporocyst after penetrating a snail. Each sporocyst gives rise to a second generation of sporocysts from which thousands of cercariae are produced. In from five to seven weeks the cercariae leave the snail's body and swim freely in the water, where they may live for from two to seven days.

The manner in which they gain entrance to the host is through the skin or mucous membrane and from there they enter the venous and lymphatic systems, by which they are carried to the heart and then to the capillaries of the lung.



Fig. 1. Descending urogram of a patient with urinary bilharzias of ten years duration showing bilateral involvement.

The migration of these organisms to their final habitat, the portal system, has been a matter of research, and in 1924 Faust and McLeney confirmed the work of Miyagawa, who stated that the route was by the way of the left heart and arterial circulation to the capillaries of the intestine and into the portal vein.

According to Manson the bilharzia hematobia reach adult life in the portal vein. In reviewing our anatomy we can visualize that the venous communication is such that the adult flukes reach the vesical, pubic and uterine plexuses and as one would expect the eggs are deposited for the most part in the base of the bladder and terminal ureter.

The symptoms are those of obstruction of the lower ureter.

The diagnosis depends on descending urograms which should show dilatation and tortuosity of the pelvic ureter. The author concludes that as bilharzias is the only disease that primarily infests the pelvic ureter without affecting the proximal portion of the ureter, this finding is pathognomonic of the infestation.

ELMER HESS, M.D.

BLADDER URETHRA AND PENIS

Stevens A. R. and Delzell W. R. Traumatic Injuries of the Bladder. *J. Urol.* 1937 38 475.

The authors found the total mortality rate in rupture of the bladder to be 63.6 per cent. They state that the greater the distention of the viscus at the

time of injury the greater the probability of rupture from a blow. The empty bladder is immune except to puncture injuries. The diagnosis may be difficult and the attention may not be called to the urinary tract for several hours after the accident. The catheterized specimen of urine is usually bloody but may be only blood tinged. The general picture is that of shock. There may be fever and coma. Local suprapubic tenderness, inability to urinate and bloody urine obtained by catheter are suggestive. There may be signs of peritonitis. Diagnosis by catheter is not always accurate. All the fluid injected may be returned in the presence of a rent in the bladder if the opening is blocked by intestine or omentum. However, all the injected fluid may not be returned in the event that the catheter is blocked by blood clots or papillomas.

The authors believe that the diagnostic value of the cystoscope overshadows possible harm. In 11 of 13 cases they have seen the rent in the bladder by means of the cystoscope. All patients were operated on promptly after cystoscopy. Cystograms usually show the presence and position of the rupture. These have been taken by the authors by injecting air or a radiopaque substance.

The treatment of traumatic injury of the bladder is prompt surgery, with drainage of the bladder and suture of the rent in the bladder. Drainage is more essential than the suture of the bladder rent. The authors believe suprapubic cystotomy should always be done. They urge exploratory laparotomy in most cases. The author reports 27 cases all operated on and they discuss the mortality of 37 per cent which they found. They emphasize early diagnosis and treatment.

GILBERT J. THOMAS, M.D.

Herbst R. H., Baumrucker G. O. and German A. L. Extensive Ulcer (Hunner) of the Bladder with an Experimental Study of the Etiology. *Am. J. Surg.* 1937 35 152.

The authors present some additional information regarding the etiology of the so-called Hunner ulcer which they have obtained from animal experimentation. They discuss the various names given to this condition and suggest a new name, bladder fissure, because of the striking similarity of the condition to rectal fissure.

The lack of causative factors is discussed. The various factors in the symptomatology, diagnosis and treatment are also discussed.

The original description of the histology by Hunner is still representative of the consensus of opinion. Two important features are stressed: the peritonium subtending the diseased area shows decided thickening and occasionally the inflammatory process may extend beyond the confines of the bladder wall and involve the perivesical tissues and adjacent structures, in which case adhesions exist between these structures and the bladder wall.

In the experimental work attempts were made to produce a lesion similar to the Hunner ulcer in the

posterior bladder wall by the following methods (1) simple ligation of the vessels of the posterior wall and vertex of the bladder, (2) suture of the vagina and uterine horns to the posterior wall and vertex, (3) scraping of the bladder wall to promote adhesions, and (4) the introduction of an infected bone spicule in a cul-de-sac formed by suturing the posterior bladder wall to the uterine horns using the fat of the uterine horns to close in the pocket at the sides and vertex

By these means experimental lesions were produced in the bladders of dogs which resembled elusive ulcers both cystoscopically and histologically

ANDREW McNALLY, M D

GENITAL ORGANS

Hamilton, J. B : The Induction of Penile Erection by Male Hormone Substances *Endocrinology*, 1937, 21 744

The author has found that the injection of male hormone substances, testosterone acetate and testosterone propionate, stimulated penile growth and erection in immature animals. Castration and hypophysectomy of adult rodents appear to result in regressive changes of the penis and diminution of erectile properties. Administration of male hormone substances to these same animals resulted in the maintenance of erectile capacity.

Injections of testosterone propionate in 5 immature children, in a twenty-seven-year-old man with hypopituitarism, and in a forty-three-year-old man who had complete impotence of eight years' duration, resulted in the production of erections, which in some cases approached a state of priapism. In immature animals, in the young children, and in the patient with hypopituitarism the complicating influences of bodily produced male hormone and mental factors were greatly minimized, so that with the additional precaution of alternating the periods of injection of the male substances with periods of injection of bland solutions, the stimulation of penile erections was traced directly to the presence of the male hormone substances.

The clear-cut stimulation of erections in controlled cases of animals, children, and older men suggests a possible value of male hormone substances in impotence, particularly in cases of hypogonadism.

HENRY L. SANFORD, M D

Williams, W. W : Spermatic Abnormalities *New England J M*, 1937, 217 946

The ability of a germinal cell to unite with that of the opposite sex and reproduce the characteristics of its antecedents is the fundamental proof of its health. It is a matter customarily proved in retrospect, and highly valuable as an advance knowledge of the cellular function may be, various tests aimed at the appraisal of spermatic health have been quite inadequate. The nucleus of the spermatozoon is its most important functional element, yet in most semen examinations its study is inadvertently avoided.

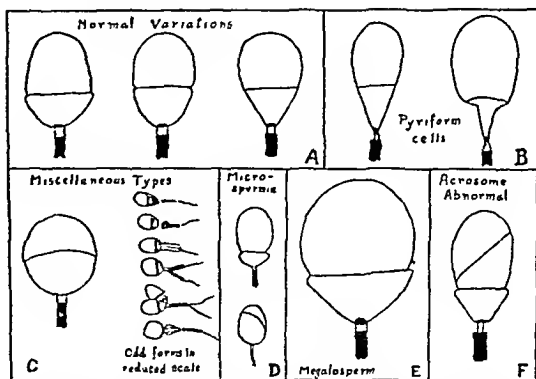


Fig 1 Diagram showing the commoner structural types of spermatozoa used in classifying populations of spermatozoa

In an attempt to throw some light upon this subject the author has been working on methods by which the morphological condition of the spermatozoon may be more readily and quickly determined, and by which the relation between the morphology of these cells and their functional probabilities is established.

The present discussion is concerned with commonly observed spermatic abnormalities, and particularly with sperm classification as a means of appraising the health and functional probabilities of sperm populations. It is hoped that this may provide a more reliable means for the determination of spermatic health.

In estimating spermatic health, various factors, such as the density of the spermatozoa in the seminal fluid, the total number of spermatozoa ejaculated, the physical and chemical condition of the seminal fluid, and the motility of the spermatozoa, require consideration, but collectively this information means little without a knowledge of the morphological condition of the germinal cells. The author believes that an examination of a semen sample based on an analysis of spermatic defects provides in itself the most reliable and valuable information for the determination of the health of a sperm population. Because such analysis is dependent largely upon objective findings, comparable results may be anticipated by different observers, provided a uniform method of examination is adopted. A type of staining should be employed that will give clear detail under at least 1,000 diameters magnification, thus allowing the spermatozoa of a given population to be examined minutely and classified in a limited number of groups, based on their morphological characteristics. For practical purposes all the cells may be classified in not more than six groups: (a) normal, (b) pyriform heads, (c) miscellaneous types, (d) microspermia, (e) megalospermia, and (f) abnormalities of the acrosome (Fig 1). Familiarity with these various morphological types is an essential step in appraising the health of a sperm population and thereby its poten-

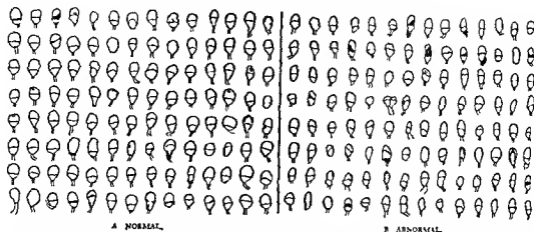


Fig. 2 A shows the tracings of spermatozoa of an essentially normal population (normal 70 piriform 16 unclassified 3 microsperms 10 megalosperms 4 abnormal acrosome 0 total abnormal 33). Note fullness of contour and uniformity of size in contrast to B which shows the tracings of a decidedly pathological sperm population (normal 54 piriform 25 unclassified 5 microsperms 21 megalosperms 1 abnormal acrosome 3 total abnormal 55). In our experience the spermatozoa from the healthier and highly fertile individuals are even more uniform in size and contour than represented in A.

qualities. It must be primarily borne in mind that healthy semen samples always contain some abnormal spermatozoa and that unless there is a very marked oligospermia it is rare to find a semen sample so badly diseased as to contain no normal appearing cells.

Since all sperm populations contain members of different sizes and shapes and even those within normal limits vary considerably it is necessary to fix firmly in mind the normal in order that a satisfactory classification of a sperm population may be made. The size is more accurately determined by actual measurement yet in actual practice with the use of the same magnification for each examination it is possible to differentiate the cells of normal and abnormal size with sufficient accuracy. A variation of the longitudinal diameter in excess of about one third its estimated mean should be considered abnormal. Since the mean diameters of spermatozoa from different normal individuals vary quite markedly it is better to consider the normally shaped cells of most frequent occurrence as of normal size for the specimen under consideration (Fig. 2).

Most abnormal spermatozoa are either of piriform shape or below normal in size. In both types there is marked alteration in the size or shape of the nucleus or in both. In the microspem there is a marked diminution in the surface area of the acrosome; the cytoplasmic portion of the spermatozoon. A normal sperm population usually contains not more than 9 per cent piriform cells and according to our arbitrary standard by which a normal variation of about 30 per cent of the longitudinal diameter is permitted we find that the semen from an apparently normally functioning sperm population contains at the most not more than 12 per cent

microspemia. We have perhaps been overcareful in designating certain cells as microspemia yet this is of no consequence if the criterion as to what constitutes normal is uniform with different observers.

Abnormalities of the acrosome are encountered in a great many specimens, but infrequently in a ratio in excess of 5 per cent even in the more pathological specimens. Ordinarily in the development of the spermatozoon the centrosomic material migrates posteriorly and from it the tail arises in a similar manner to the cilia of somatic cells. At the same time the nucleus assumes a posterior position in the head and the anterior aspect of the nucleus then becomes flattened to form a line transversely across the head a little posterior to its geometric center. If spermatozoa are properly stained it will often be found that the relation of acrosome to nucleus is altered. There may be too little or too much acrosome or the acrosome may be laterally placed with respect to the nucleus. Some of these cells are of normal size others should be classified as microsperms or megalosperms.

An interesting type of anomaly is the presence of vacuoles in the sperm heads usually in the acrosome and lying close to the transverse nuclear line. These vacuoles have been observed in a frequency of as many as 33 per cent of the cells of a population but in some specimens no vacuolated cells are found. There seem to be two types of vacuoles, one of which measures 0.5 micron and the other about 2 micra. The latter often ruptures to the surface causing a jagged rent in the cell wall laterally just anterior to the nucleus or if it ruptures from the flat surface of the acrosome it appears as a crater. We have no evidence that these vacuoles have functional significance.

A normal semen sample contains a sperm population of tremendous numbers, ordinarily as many as 60,000 spermatozoa per cubic millimeter, and a single ejaculation may contain as many as half a billion cells. The members of this population differ in various attributes such as size, shape, motility, fertilizing power, and ability to transmit normal or morbid Anlage. Different sperm populations vary in functional effectiveness according to the number of healthy cells present. Naturally, this is materially affected not only by the ratio of abnormal cells but also by the total number of cells ejaculated. In the presence of oligospermia the number of effective cells becomes materially reduced and a high ratio of abnormal cells becomes increasingly significant. Because morphology is unaffected by various extrinsic factors, it becomes evident that a classification of a sperm population such as outlined is indispensable in a clinical study of spermatogenic function. Further, motility tests alone may give false evidence of health, because pathological cells may be highly motile. The author agrees with Moench that a population of normal density containing not more than 20 per cent abnormal forms may be considered normal, but that this consideration should be tempered by the type of abnormalities present. Realization that there is a considerable variability in the structure of normal spermatozoa, and, further, that nuclear changes are apparently of great significance will aid materially in deciding which spermatozoa should be considered abnormal and whether a given sperm population should or should not be considered functionally unfit for propagation, yet unless it is possible to adopt a more uniform basis for analysis by different observers and to study the spermatogenic picture in different clinical groups, it will be difficult to arrive at a sound interpretation of spermatogenic disease in its various possible implications.

Infrequently, from the Mendelian law, we may assume that inherent functional attributes are distributed among the spermatozoa of a given sperm population in a constant ratio. On the basis of repeated examinations of semen samples, we know that individual characteristics tend to remain constant, both as to type of morphological variations of the spermatozoa and as to the ratio of such cells in the population. Because of this, and because of

the improbability of two different persons presenting identical pictures in these respects, a careful examination may provide a means of identifying a semen sample as that of a given individual, and possibly point to significant hereditary tendencies.

C TRAVERS STEPITA, M D

Bjerre, H.: The Indications for Treatment in Cryptorchidism (Die Behandlungsindikationen bei Kryptorchismus). *Ugesk. f. Læger*, 1937, p 513

The author reporting on 188 consecutive examinations of students stated that spontaneous descent of the testes occurred in 63 per cent of all patients followed up to fifteen years of age. After this age spontaneous descent was not observed, and the testis fixed in the inguinal canal was subject to anatomical and functional degeneration. In a series of 196 other children, 250 operations (orchidopexy) were performed over a period of thirty years, of these 58 per cent were successful. The failures resulted from degeneration of the testis, and from failure of the artificial reposition of the testis. Since the end-results of operative and conservative treatment are almost identical, operative intervention should be postponed until puberty as long as there is no urgent indication for surgery, such as complete inguinal hernia, attacks of pain, or twisting of the testis. In a series of 20 bilateral operations for cryptorchidism, artificial descent was a failure in 5 cases. All 5 of these patients were sterile as regards spermatogenesis. After 15 successful operations, 9 patients were found to be capable of reproduction and 6 were sterile.

In spite of the danger of testicular atrophy and sterility, surgery is indicated after puberty because approximately 10 per cent of all malignant testicular tumors occur in undescended testes. As the incidence of cryptorchidism is $2\frac{1}{2}$ per cent, the danger of cancer is 40 times greater than in patients with normal testes.

The experiences with therapy with hormones from the anterior lobe of the pituitary gland are still a matter of controversy and the material for complete evaluation of the end-results is still small. In 2 cases the author saw 1 partial success, and he is not certain that it might not have occurred spontaneously.

(HENNINGSEN). JACOB E. KLEIN, M D

SHOULDER PAIN AND DISABILITY DUE TO LESIONS OF THE SUBDELTOID BURSA AND SUPRASPINATUS TENDON

A Five Year Collective Review

L. KRAEER FERGUSON, M.D., F.A.C.S., Philadelphia, Pennsylvania

INTRODUCTION

PAINFUL lesions of the shoulder were first brought to the attention of the medical world by Duplay in 187. He described the clinical picture, painful stiffness of the shoulder often following trauma and placed the pathological lesion in the subdeltoid bursa. His name for the clinical syndrome, periarthritis humeroscapularis is still used as a general term to cover many different pathological entities of the shoulder region. Since the time of Duplay, many authors have written concerning these conditions, and new names also non descriptive, such as subacromial or subdeltoid bursitis periarthritis of the shoulder and painful shoulder, have appeared. As the x rays came into common usage, calcified shadows were demonstrated in many patients with pain in the shoulder and the name 'bursitis calcarea subdeltoidea' or 'subacromialis' or calcified bursitis came into general usage. About 1906, Codman began to preach the doctrine that many of the lesions producing painful symptoms in the shoulder were primarily of the supraspinatus tendon and that the involvement of the bursa was secondary.

As the literature concerning this very interesting syndrome is reviewed one is impressed with the perfectly natural but none the less confusing nomenclature that has arisen. The difficulty seems to arise from the fact that the nomenclature does not usually refer to any specific clinical or pathological entity. Thus the term 'bursitis' may refer to any painful lesion of the shoulder region with or without a calcium deposit with 'acute' or 'chronic' symptoms with or without loss of motion in the shoulder. An attempt will be made to clarify the subject by combining the described pathological lesion with the corresponding clinical picture and suggested treatments.

ANATOMY AND PHYSIOLOGY

A long discussion of the anatomy of the shoulder region cannot be given here but the descriptions found in Codman's book (12) are recommended to those who wish to make a complete study of the comparative and human anatomy.

The anatomical region of concern is the region of the secondary scapulohumeral joint lying between the upper end of the humerus and the acromial process (See Figure 1.) The firm floor of this joint is formed by the flat tendons of the short rotators the supraspinatus, infraspinatus and to a less extent by those of the teres minor and subscapularis. The capsule of the shoulder joint is intimately attached to the under surface of these tendons up to their insertions on the greater tuberosity. Overlying the tendinous cuff and the greater tuberosity and forming the under surface of the acromion acromioclavicular ligament and origin of the deltoid, is the capsule of the pseudojoint, the subacromial bursa.

Codman (12), from whom the following description is quoted almost verbatim is convinced that the subacromial the subdeltoid, and the subcoracoid bursae are one and the same thing although films of tissue may separate them. The bursa extends loosely downward under the deltoid, backward and outward under the acromion and inward under the coracoid between it and the subscapularis, and under the common origin of the short head of the biceps and the coracobrachialis. "The roof and the base of the bursa are in intimate contact and the bursa is lined by thin synovial membrane which secretes enough synovial fluid to permit practically frictionless movement between the two surfaces. Beneath this layer is a network of fine blood vessels so that it may become congested in a short time. The subacromial bursa is an absolutely necessary part of the shoulder joint. When its surfaces are inflamed so that they cause painful friction, the arm cannot be rotated or abducted. The complete adhesion has the same effect."

Meyer's (63) description of the bursa differs somewhat from Codman's. He describes it as having no lining of endothelium or highly specialized mesothelium resting on a subserosa in stead there is a gradual transition from the surface layer of flattened stellate mesothelium to ordinary connective tissue.

Skinner (75) who made a comparative anatomical study of the shoulder in various ages has

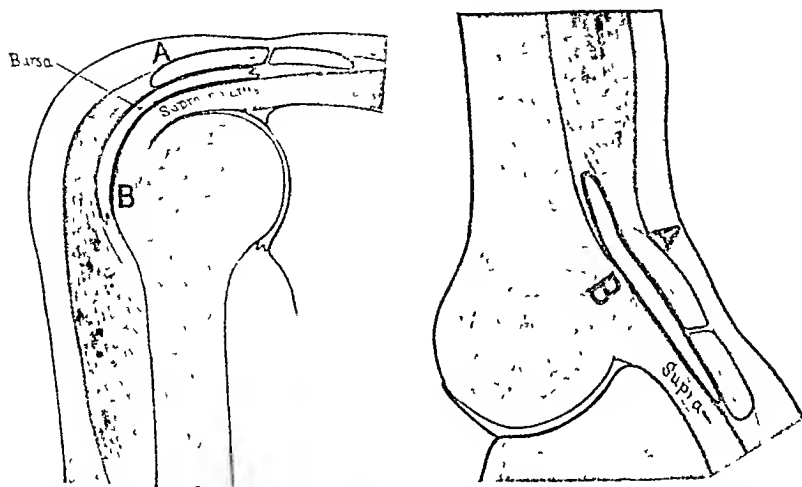


Fig 1 Elevation of the subdeltoid bursa, (left) in repose, (right) with the arm in full abduction. The drawings were made from frozen sections and are semidiagrammatic [From Codman (12), page 25]

shown that in infants the supraspinatus is muscular up to its insertion. With advancing age, the lateral portion of the muscle becomes tendinous. This change involves also the other short rotator muscles. Gradually the tendinous cuff thins to become aponeurotic, so that there is only a thin separation between the shoulder joint and the bursa. The subacromial bursa, which Black (3) found present as early as the third fetal month in 72.5 per cent of fetuses, enlarges gradually to the extent of the aponeurotic change. Skinner believes these tendinous alterations occur because of the function of the supraspinatus and deltoid in abduction of the arm. He agrees with Codman and Stevens that the supraspinatus is concerned with the first stages (15 to 30 degrees) of abduction. During this stage, the deltoid contraction pulls in the long axis of the humerus and compresses the supraspinatus between the upper end of the humerus and the acromial arch. A continued "ironing" or "rolling" compression of the supraspinatus tendon by abduction movements is believed to produce the changes observed by Skinner. A recognition of this more or less normal alterative change in the supraspinatus tendon with advancing age is an aid in understanding the pathological lesions which occur in this region in later life, about which more will be said later.

PATHOLOGY OF THE SUBACROMIAL BURSA AND SUPRASPINATUS TENDON AND ADJACENT STRUCTURES

The subacromial bursa. Meyer (63) has for a long time contended that the ordinary, oft-

repeated everyday uses of the arm result in a roughening and fraying and complete destruction of the smooth inner surface of the subacromial bursa. He finds this change in most cadavers past middle age, and it is most marked in those "portions of the surfaces of the subdeltoid bursa which are brought into firm contact with every abduction of the arm." Meyer does not believe that these changes are the result of an inflammation, a bursitis, but rather that they are produced by long continued movement of soft parts on each other resulting in a roughening and fraying of apposed structures. Keyes (53) has also noted erosions of the floor of the bursa in cadavers.

These more or less normal attritional changes noted with advancing age are not the only lesions of the bursa. Codman (12) has noted the presence of synovial villi as the most common evidence of pathology in the bursa itself. These capillary villi arise from a roughened area in the floor of the bursa overlying the insertion of the supraspinatus. They may "represent overuse rather than inflammation," but Codman believes "their presence is evidence that there has been inflammation and adhesion of the bursal surfaces,—and are probably remnants of organized exudate."

Codman's clinical experience has permitted him to observe also in a few cases thick, cord-like "bands of fibrous consistency" in the bursa, and in other cases bright-red, swollen folds of bursal lining, or a "deep red circular zone of turgid membrane lying on the base of the bursa in the region of the supraspinatus facet." Adhesions between the surfaces of the bursa have been described by

many observers Keyes (53) has found some bursae "almost completely obliterated by fibrous adhesions, tough or fine." Codman rarely finds the adhesions in the subacromial portion of the bursa and most often in the subdeltoid part. He regards them as protective inflammatory changes.

The supraspinatus tendon. Practically all lesions of the supraspinatus tendon appear in its most lateral portion at or near its insertion on the greater tuberosity. Most authors agree that the lesions produced are the result of trauma either minor in nature and oft repeated, as in the normal shoulder movements producing what Meyer (63) terms 'functional lesions,' or more severe and sudden resulting in more marked and disabling changes.

Straps is the name given by Codman (12) to a layer of damaged tendon fibers which have become detached from the upper surface of the tendon. They lie in the direction of the fibers of the tendon attached at each end and tend to buckle up over the greater tuberosity with abduction of the arm. Meyer (63) has noted this longitudinal ribboning or scoring of the bursa and tendon "whenever the margin of the acromion or its under surface is rough or studded with small periosteal osteophytes." Codman is not sure whether it results from friction or is the sequela of a discharged calcified deposit or partial ruptures. Degenerative changes in the tendon fibers are recognized as an almost normal change with advancing age. Keyes (53), Schaefer (72), Sandstrom and Wahlgren (71) and Codman (12) all present excellent photomicrographs which show these changes in varying stages. Sandstrom and Wahlgren characterize this process as an alternative inflammation which they believe is due to a circulatory disturbance brought about by pathologically altered arterial branches with narrowing of the lumen.

Since the early papers of Codman and Carnett (7), it has been repeatedly shown that the calcified deposits occur in the substance of the tendons of the short rotator muscles. These deposits appear most often in the lateral portion of the supraspinatus tendon but they may also occur in the tendons of the subscapularis, teres minor, and infraspinatus. These deposits are not limited to the tendons of the shoulder region. Hitchcock (45) and Callen (6) have pointed out that similar deposits may be found in the tendons adjacent to many joints: hip, knee, ankle, elbow, wrist, metacarpal and phalangeal. The cause of the calcium deposits has been the subject of considerable discussion. Gwynne and Robb (37), Schaefer (72) and Dixie (21) believe that the probable cause is

injury with hematoma formation and secondary deposit of lime salts in the hematoma. Most of the more recent writers Codman (12), Haggart and Allen (38), Dickson and Crockett (39), Mischet (64), Wilson (84), Leriche and Jung (50), Hitchcock (45) and Callen (6), suggest that repeated minor traumas produce minute tears followed by a local necrosis in the tendon fibers. The deposit of calcium salts occurs instead of normal healing because of the poor circulation in this area. Sandstrom and Wahlgren (71), who made a thorough pathologicohistological study of material from 12 cases, could find no evidence for considering trauma an etiological factor in the formation of calcium deposits. They picture the process as a relative local tissue anemia with a reduction in tissue vitality and secondary calcium deposition. Furthermore they believe that improvement in symptoms and disappearance of the calcium deposits is probably due to an increased vascularity. In this way they account for the improvement noted after x-ray therapy.

Hitchcock (45) recalls to attention the mechanism of calcium deposition as described by Aoki (54). This author has shown that the deposition is always preceded or accompanied by the formation of soaps in the degenerating tissue to which calcium is immediately attracted from the body fluids. Such soaps may be found in the peripheral zone of the calcareous infiltration while calcium is still being laid down even when the process is quite extensive. Replacement of the fatty acid by the stronger phosphoric and carbonic acids rapidly ensues giving rise to the more stable calcium phosphates and carbonates of which these deposits are largely composed.

Hitchcock believes that trauma is the initiating factor in the degenerative process, but has found the typical histological picture to be an acute or chronic inflammation occurring around the calcareous matter which he believes acts as a foreign body. He is of the opinion that the disappearance of the calcium deposit occurs as a result of hyperemia. Several authors (Sandstrom and Wahlgren (71), and Aoki (53)) have called attention to the fact that these deposits might be composed of uric acid or uric acid salts. However Aoki found the uric acid in the blood and serum to be normal as was also the blood calcium and phosphorus. The composition of the calcium deposits has been reported upon by numerous authors. It varies from a white hard mass of the consistency and appearance of chalk to a whitish milk-like fluid. Most often it has been found to be similar in color and consistency to toothpaste or as Codman describes it "to ordinary zinc ointment." In most

cases the deposit is amorphous, although in Hitchcock's experience the maintenance of an adequate blood supply may result in a formation of true heterotopic bone. The chemical composition of the deposit has been studied by various authors, the consensus of opinion seems to be that it consists of calcium phosphate and carbonate with traces of iron, magnesium, and chlorides.

Ruptures of the supraspinatus tendon have been emphasized by Codman as the common and perhaps the underlying lesion in many of the cases presenting shoulder disability. Since Codman's first description of the lesion, numerous studies have appeared. These may be divided into those made on cadavers and those made at the operating table. Chief among the studies upon the shoulder in cadavers are those by Meyer (63), Keyes (52, 53), Skinner (75), and Codman and Akerson (13).

Meyer, in his extensive experience, has noted progressive attritional changes in the supraspinatus tendon which he believes are due largely to erosion and fraying of the tendon against the acromion. This fraying is attendant to longitudinal slits or ruptures, not only in the supraspinatus tendon, but also in the other tendons in the musculotendinous cuff. He notes that these perforations occur first somewhat proximal to the greater tuberosity. Only rarely has he seen transverse tears in the tendon. Meyer points out that on the basis of relative tensile strength, the tendon of the supraspinatus can bear a pull of from 700 to 1,000 pounds without rupturing, whereas the muscle itself can withstand a pull of only about 170 pounds. On the basis of these figures, he concludes that a rupture of a normal tendon should rarely take place. Meyer does not believe that any of the types of tendon rupture which he has seen in cadavers averaging about sixty years in age could heal spontaneously.

Keyes, who likewise studied the shoulder in the dissecting room, found ruptures of the supraspinatus tendon in 18 of 98 cadavers, also in older bodies, the youngest specimen being forty-five years old. In none of his specimens did he find a complete separation of the supraspinatus tendon. Most of the ruptures involved both the supraspinatus tendon and the underlying joint capsule. He presents photomicrographs of ruptured tendons showing nests of curled up connective tissue fibers, fraying of the surface of the tendon, and rather marked degenerative changes. Keyes believes that the lesions which he has observed differ from those of complete traumatic rupture of the tendon found at operation. Skinner (75)

reported on the examination of 100 shoulders in the dissecting room. He shows photographs of several large ruptures and concludes that the process is a slow ironing out and thinning of the tendon of the supraspinatus. This process, he believes, precedes and perhaps is the predisposing cause for tendon rupture. Codman and Akerson reported observations on old individuals in the autopsy room.

The observations of rupture of the supraspinatus tendon have been made by several authors at the operating table. Codman is of the opinion that the rupture takes place close to or at the insertion of the supraspinatus tendon on the greater tuberosity, it is most commonly seen with its inner margin at the bicipital groove, but it may extend to involve the tendinous fibers which bridge over the groove so that the biceps tendon may be laid bare. The tear is usually triangular in appearance, the base being along the greater tuberosity and the apex pointing in the direction of the pull of the supraspinatus tendon. In the cases that he has observed, the tear has varied from $\frac{1}{2}$ to $1\frac{1}{2}$ in in length. In the patients of the younger age group, a stub of tendon may be found attached to the greater tuberosity. In older individuals the base of the triangular rent is more often bone with little or no remaining tendon stub. On the basis of his experience with operations on these tendons sometime after rupture has taken place, Codman is inclined to believe that at least partial healing may take place in incomplete tears in younger individuals, a process which is characterized first by a rounding off of the corners of the triangular tear and then by a gradual filling in of the remaining gap. In older individuals, the tears show little tendency to heal, the edges of the tear being somewhat rounded and falciform in shape. The observations of Wilson (84) on operative cases are similar to those of Codman's.

Bone and joint changes. Various investigators and clinicians have frequently mentioned the changes that appear in the greater tuberosity and the acromion process. As the supraspinatus tendon becomes thinned or after its rupture, the greater tuberosity is relatively more prominent. This produces an irregularity in the floor of the bursa which causes a jog as the greater tuberosity passes under the acromion. The result is a stimulation of the traumatized periosteum with the production of excrescences and osteophytes along the edge of the acromion and along the tip of the greater tuberosity. These changes have been noted in anatomical specimens by Keyes (53), Skinner (75), Meyer (63), and Codman and

Akerson (13) Associated with these hypertrophic changes there may be a definite pitting of the surface of the tuberosity. Keyes and Skinner note that these changes are most marked when associated with large tears of the supraspinatus tendon. When the bone is laid bare, a smoothing off with eburation may follow, because of a polishing of the greater tuberosity against the under surface of the acromion. This produces a gradual lowering of the height of the tuberosity and a rounding of the contour of the shoulder, and probably accounts for the gradual but eventual improvement which is observed in some of these patients.

In addition to these surface changes, there are those which take place in the underlying bony structure. Local areas of rarefaction, trabecular atrophy, and decalcification are the most frequent lesions. Unfug (79) has described these changes from the roentgenographic point of view, and he emphasizes the importance of taking roentgenograms with the arm in both external and internal rotation. With the arm in external rotation the greater tuberosity is shown in better profile and these changes are more easily noted.

It seems apparent that these bony changes should show marked variations due to differences in the underlying pathology. With the acute type of bursitis with calcification there is often very marked localized bone atrophy of the greater tuberosity as noted by Haggart and Allen (38), Codman (12), and others. This change probably results from a hyperemia of the underlying bony tissue. In the more chronic lesions these changes are less marked.

ACUTE TRAUMATIC BURSTITIS

Hitzrot (46) points out that the commonest cause of disease in the subdeltoid bursa is injury. The injuries may be relatively minor, such as overuse of the arm in abduction wrenches and twists of the shoulder joint blows upon the shoulder, or more commonly falls upon the arm or hand with the arm in partial abduction.

Ferguson (30) describes the symptoms and findings on examination: acute tenderness over the greater tuberosity with pain on attempts at abduction of the arm. The pain is more marked if abduction is attempted against resistance. A roentgenogram should be taken to rule out any underlying bony lesion. The pathological lesion is believed to be a traumatic inflammation of the subdeltoid bursa with an exudative reaction of greater or less degree, congestion of the bursal walls, and even adhesions between bursal layers (Hitzrot).

In cases of simple acute bursitis immobilization with adhesive strapping (Ferguson 30) or by axillary pad body swathe, and wrist sling (Gordon 34), followed by heat and graduated exercises, usually results in a cure in a period of from ten days to two weeks in younger patients. In older individuals with pre-existing articular changes in the region of the bursa recovery is slower. Trauma in such cases may lead to any of the types of bursitis to be described later. Mau (60) treats his patients who are over forty years of age in an abduction splint with external rotation of the arm. This dressing is maintained day and night until the arm can be actively abducted as well as the normal. Echtman (23) uses cold applications and galvanism to the shoulder in the acute stages of traumatic bursitis, after the acute stage has passed infra red radiation and massage are employed.

An acute traumatic bursitis is a lesion associated with injuries to the acromioclavicular joint, dislocation of the shoulder, fractures of the head, neck, and tuberosities of the humerus, and injuries of the supraspinatus and infraspinatus tendon (Hitzrot). In such cases the presence of the bursal lesion is usually not considered in the treatment of the more evident bony or tendon injury. It is probable, however, that residual changes in the bursa due to trauma may account for some of the persisting shoulder disability seen in these cases.

ACUTE SUBACROMIAL BURSTITIS WITH CALCIFICATION

The clinical picture of acute subacromial bursitis with calcification has been described by Codman (12), Hitzrot (46), Haggart and Allen (38), Erb (26), and Ferguson (30). The outstanding characteristic is the presence of agonizing pain in the shoulder. This is usually sudden in appearance, although there may be periods of momentary discomfort in abduction movements preceding the acute attack. The pain is completely disabling; the arm is hugged to the side and cradled by the well arm, because any movement increases the severity of the pain. Sleep and rest are impossible for these sufferers; no position, sitting, standing or lying, seems to offer any relief, even relatively large doses of morphine give only temporary improvement. The pain is usually most acute over the greater tuberosity but also radiates down the arm and upward over the shoulder and lower neck. The region of the deltoid insertion is often described as the site of the most intense pain (Codman believes this may be due to a tonic spasm of the fibers of the lower deltoid and has noted a thickening and tender

ness in this area Haggart and Allen believe this localization of pain is probably reflex)

The patient is characteristically of the middle-aged, white-collar group The most striking feature is the acute tenderness over the greater tuberosity which, on careful examination, may be shown to correspond closely to the outlines of the underlying bursa If the patient can relax his arm in the hands of the examiner, anteroposterior motion and usually slight rotation can be obtained at the shoulder. Abduction even of the slightest amount, however, increases the pain

An x-ray examination of the shoulder region usually discloses a relatively large calcified deposit lying fairly well out over the greater tuberosity. An associated bone atrophy in the region of the tuberosity may be noted, "if the calcified deposit has been present for some time before onset of acute symptoms" (Haggart and Allen (38).)

This acute type of subacromial bursitis with calcification is one lesion of the shoulder in which the diagnosis can be made with a fair degree of certainty, because the cause of the symptoms can be fairly well explained. An area of calcification, usually in the tendon of the supraspinatus, suddenly becomes the seat of an acute inflammatory process which produces tension in the unyielding fibers of the tendon, an acute inflammatory reaction in overlying bursa, and secondary spasm of the adjacent muscles

Codman states that the acute symptoms usually subside in one or two weeks with disappearance of the spasm and soreness and a gradual return of normal motion. In those patients who get entirely well, he believes the soft calcified deposit has spontaneously ruptured into the bursa, whence it has been absorbed

In cases of acute bursitis, comparatively rapid relief from the agonizing pain and early resumption of normal shoulder motion may be expected by relief of tension in the area of calcification. The surest and most rapid method of treatment is exploration of the bursa with incision of the calcified deposit in the supraspinatus tendon. The operation can be easily performed under local infiltration anesthesia (Codman 12). The addition of adrenalin to the novocaine solution makes an almost bloodless field (Ferguson 30). Brachial-plexus block gives a more complete anesthesia than local infiltration. Of course, general anesthesia may be used if the patient or surgeon so chooses. The incision is made over the anterior surface of the greater tuberosity, its upper end near the level of the acromioclavicular joint. It should be an inch or more in length, depending upon the experience of the operator. After sep-

arating the fibers of the deltoid, the roof of the bursa is divided and held open by suitable retractors. The base of the bursa may be inspected by turning the flexed arm in internal and external rotation. In typical acute cases, the floor of the bursa is hyperemic, but a circular area of deep red injected tissue is usually the guide to the calcium deposit. "The deep red tissue, resembling that of a bloodshot eye, surrounds a white or pale area . . . sometimes mounded up like a boil" (Codman). When this area is pricked with the point of a knife, a whitish, toothpaste-like material escapes as if under pressure, and curls up in the wound. The wound in the tendon may be enlarged, and as much as possible of the calcified material gently removed with a small curette. Vigorous efforts to remove all of the calcium are injudicious and unnecessary. The writer's experience has confirmed Codman's statement, "I have often times been content with merely incising one of these pockets, making no effort to curette out all of the material. The symptoms have disappeared quite as satisfactorily as in cases where a thorough curetting was done."

After removal of the escaped calcium deposit, the wound in the muscle is loosely closed with interrupted catgut sutures, and the skin is sutured. Codman makes no effort to suture the bursa in his closure, and Haggart and Allen (38) excise a portion of the roof of the bursa before closing the wound.

After operation, the patient is treated with the arm in a sling, movement of the arm is encouraged but not forced. Haggart and Allen (38) keep their patients in bed with local heat to the shoulder for forty-eight hours. Ferguson (30) has treated most of his cases as ambulatory patients with good results. A very important part of the post-operative care is the use of exercises to redevelop shoulder muscle power and shoulder motion. Codman and Haggart and Allen have illustrated the swinging exercises (see Figure 2) in the stooped position. The latter authors report 25 cases without a recurrence in the operated shoulders. Codman reports similar results from a like number.

A second method of treatment which has come into favor during the past few years is novocaine injection into the bursa and supraspinatus tendon. Haggart and Allen (38) use this method of therapy for patients who refuse operation or those who are under no economic stress and strain. Combined with intensive local heat and exercises, it gives appreciable relief of discomfort, and apparently assists in more rapid removal of the calcified deposit, presumably by increasing the local circu-

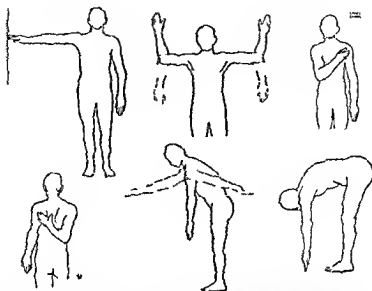


Fig 2 Illustrating the types of exercises to redevelop shoulder muscle power. Particular attention is directed to the pendulum exercise performed with the trunk flexed. The arms are swung anteroposteriorly and also in a mediolateral (rot shown) direction. Climbing the wall with the fingers of the outstretched abdu- & arm is also most valuable [from Haggart and Allen (38)]

lation and perhaps, by puncturing the tendon, a way is provided for some of the calcified material to rupture into the bursa. Haldeman and Soto-Hall (30) also have obtained relief of symptoms and disappearance of the calcium shadow in a few days from novocaine injections. Smith Peterson at the Massachusetts General Hospital, exhibited x-ray plates and cited cases of early relief of pain and disappearance of calcium shadows by the same methods. In some cases he was able to aspirate the soft calcium material into a syringe and to remove considerable amounts by irrigation of the deposit with saline introduced through a second needle.

Recently Patterson and Darrach (66) have described their method of the treatment of acute bursitis by needle irrigation under local anesthesia. They use two 18 gauge steel needles which are inserted into the bursa in slightly different directions. After the needles are in place the calcified deposit is removed by irrigation with saline from one syringe, the fluid and calcium escaping through the second needle. They have found it takes from 30 to 60 c cm of saline to remove the calcified material. This method of treatment gives almost immediate relief from acute pain, and usually the period of treatment is less than one week. No recurrences were noted in

63 cases treated by this method. The writer has had a similar experience with injection and irrigation in a number of cases of acute bursitis. Weeks and Delprat (82) have used multiple needle punctures in the treatment of acute bursitis since 1908. They inject no novocaine except into the skin, but believe their good results are due to lacerations produced in a tense bursal wall with later vascularization. The calcium deposit as well as the pain disappeared.

Haggart and Allen (38) describe the technique of novocaine injection. They use intravenous ethipal or cyclopropane anesthesia because of the great pain which the individual has experienced. (The writer has found brachial plexus block an excellent anesthesia.) With a needle, at least 20 c cm of 2 per cent novocaine solution is introduced into the bursa. In addition the capsule of the shoulder joint is injected and an attempt is made to inject the tendon in the region of the calcified deposits. These authors have had such encouraging results from injection that they are using it progressively in more cases but they warn that since the calcified material is not actually curetted out even though it disappears in the roentgenogram the patient may be more susceptible to future attacks and later, to tendon rupture.

Hempel (44) uses a similar technique Under brachial-plexus block and a V-shaped periarticular block, he injects from 30 to 40 c cm of a 10 per cent solution of pantocaine and from 30 to 40 c cm of a 1:1000 solution of rivanol After the acute phase has passed, he uses heat, diathermy, massage, and exercises He reports good results Schaer (72) mentions Continental workers who use a variety of solutions for injection

It seems probable that the various injection treatments are effective because they relieve tension in the calcified deposit and produce some vascular change in the bursa

Roentgen therapy for acute bursitis has had an increasing number of advocates in the recent literature, most numerous in the English and Continental publications Erb (26), Gleichmann (33), Chaumet (10), Schaer (72), Cavigiane (8), Kahlmeter (48), and Lattman (56) all report on the use of this method They note early relief of pain and disappearance of the calcium deposit In some cases more than one treatment is necessary The pain is often increased for the first twenty-four hours after treatment, but is usually relieved after forty-eight hours (Lattman) The beneficial results are believed to arise from a vascular change in the bursa (Sandstrom and Wahlgren 71) Lattman uses 350 roentgens with the following factors 200 kv, 0.25 mm copper filter, 50 cm distance, fields 15 by 15 cm to the shoulder anteriorly and posteriorly He reports good results in 15 of 20 cases

Various other authors recommend local heat as the method of choice for the treatment of acute bursitis Diathermy has many advocates Erb and Friednszik (26, 27), Wallace (80), and Mumford (65) have had good results from this type of therapy Mumford reports on 36 cases, with relief of symptoms in from four to ten days The calcium deposit disappeared in from four to ten days, and no other special treatment was required to restore full function Hitzrot (46) has found that dry heat and diathermy increase the pain in the acute stages of bursitis, and uses, instead, rest in bed, large doses of morphine, and local applications of moist heat In from seven to ten days, after the acute symptoms have subsided, he uses dry heat, diathermy, massage, and exercises When there are large calcium deposits, however, he finds operation gives the most rapid and striking results Weisblum (83) uses iodine by ionization in addition to diathermy Hellsfors (43) wraps the shoulder in cotton dressings and gives large doses of salicylates After the pain subsides, exercise, diathermy, and non-specific protein therapy is used

A final method of producing hyperemia of the shoulder is suggested by Braunschweig (5) He tries to produce a Bier's hyperemia by using an Esmark band around the shoulder, and reports good results

Dickson and Crosby (20) combine systemic treatment (*vide infra*) in their acute cases with a local regimen consisting of rest in bed with traction in abduction and external rotation They have found ice rather than heat more effective in the relief of the acute pain On the third day sedative diathermy is given and the arm is cautiously moved once passively through the full range of shoulder motion As the acute symptoms subside voluntary exercises are encouraged

If it is permissible for the reviewer to hazard an evaluation of these methods of treatment in acute bursitis, he would begin with the premise that relief of pain and resumption of normal function follows relief of tension in the calcified deposit and a subsidence of the acute inflammatory reaction about it and in the bursa The most rapid results would be expected then from a direct attack upon the calcification, either by operation or by needling, with or without novocaine injection or irrigation By irradiation therapy there is probably induced a more acute hyperemia with a slow disappearance of the calcium by absorption As the tension is relieved more slowly by this method, less rapid clinical improvement should be expected Diathermy probably produces a hyperemia with similar results but the effect is even slower, in many cases hardly more rapid than might be expected if the patient had been put to bed and given sedatives

Some of the more brilliant results from the more conservative forms of therapy may be attributed to a spontaneous relief of tension in the area of calcification by spontaneous rupture into the bursa. Since relief of symptoms is the paramount therapeutic indication, the methods which give the most rapid relief seem to recommend themselves

CHRONIC BURSITIS WITH OR WITHOUT CALCIFICATION

The patients grouped under this heading are those with subacute or chronic pain in the shoulder but without marked limitation of motion They usually note the pain with abduction movements, as the motion of putting on a coat. At times a sudden motion (usually in abduction) causes the individual to drop objects he is holding in his hand (Haggart and Allen 38). As a rule the pain is worse at night, and the patient is unable to lie on the affected side In the patients with more

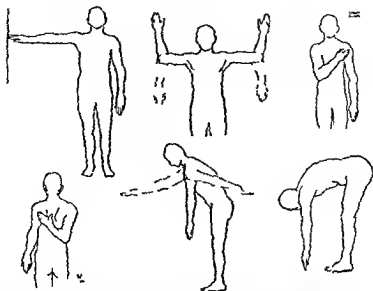


Fig 1 Illustrating the types of exercises to redevelop shoulder muscle power. Particular attention is directed to the pendulum exercise performed with the trunk flexed. The arms are swung anteroposteriorly and also in a mediolateral (not shown) direction. Climbing the wall with the fingers of the outstretched abducted arm is also most valuable (from Haggart and Allen (38))

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of their chronic cases. Coste (16) looks upon the condition as a neuralgia with contracture and spasm of the muscles. He relieves the pain and spasm by blocking the suprascapular and circumflex nerves (see Figure 3) with novocaine. Szubinski (76) looks upon the pain as a neuritis of the supraspinatus nerve and, after novocaine anesthesia, injects 15 c cm of a pepsin mixture made up as follows: pepsin puris 40, acid hydrochloric 20, thymal 0.1, aqua 2000.

As a means of applying heat to the painful area, diathermy has many advocates. Harris (41) has reported good results in 80 per cent of his cases. He has given from 7 to 20 treatments and concludes that if the treatment does not help it can do no harm. Gwynne (37) uses rest and massage with diathermy, and reports good results in 8 of 10 cases. In 2 cases the convalescence was prolonged and in one there was a recurrence of symptoms. Grossman (36) believes there is no relation between the calcified area and the pain because he often finds larger deposits in the roentgenogram of the unaffected shoulder. He employs diathermy and infra-red radiation with manipulation. Bohner (4) reports a case in which the calcified deposit and painful symptoms disappeared with 12 diathermy treatments. Dickson and Crosby (20) use diathermy on alternate days combined with rest on an abduction splint. Reich (69) also urges rest in abduction as a method of therapy and warns against the stiffness which may follow the use of the simple sling. Ferguson (30) finds diathermy an effective form of heat therapy in about one-half the cases of chronic bursitis showing calcified deposits. Carnett (7) found diathermy eased the pain temporarily in cases with calcification, but he did not believe it was effective in hastening absorption of the calcified mass. Haggart and Allen (38), on the other hand, have not found diathermy of particular value in such cases of chronic bursitis, although they have had a large experience with its use.

The treatment of chronic bursitis with roentgen irradiation is probably one of the latest therapeutic suggestions. This method of treatment finds many advocates, especially in the Continental literature. As yet, there seems to be no uniform technique for the administration of the irradiation, the reports vary greatly in dosage, portals, and numbers of treatments. Gleichmann (33) prefers x-ray irradiation to all other methods of treatment. He reports favorably on 5 cases, uses from 1 to 3 shoulder (10 by 15 cms) fields, and gives from 150 to 250 roentgens. He repeats the treatment at from 2 to six days intervals for 3 treatments. His patients have noted an exacer-

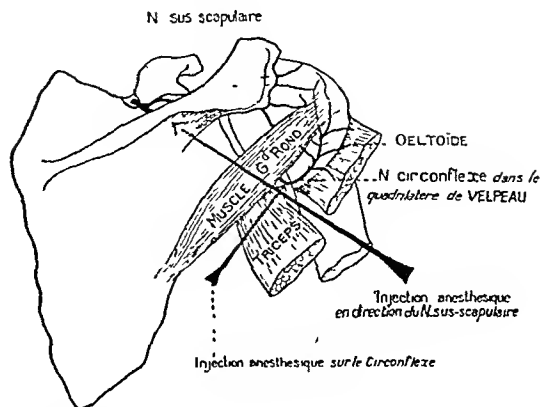


Fig 3 Diagram showing the method of injecting the suprascapular and circumflex nerves. The suprascapular nerve is injected from behind, passing under the acromion to reach the nerve as it passes around the coracoid process. The circumflex is injected by passing the needle through the quadrilateral space of Velpeau. [From Coste (16)]

bation of pain for the first twenty-four hours, but usually are relieved completely with the third treatment. Chaumet (10) is also partial to roentgen therapy. He gives a second series of treatments in forty-five days. In his acute cases, he combines roentgen therapy with infra-red irradiation and massage. He reports 45 cases with cures in from two to six months. Monchet (64), Didiée (21) and Cavigiane (8) all have had good results with irradiation therapy. Segre (73) gives 2 treatments and has usually obtained relief of symptoms. Lattman's (56) paper, previously referred to, gives the best review in English of this method of treatment.

In the experience of the reviewer, chronic bursitis is a lesion which may or may not respond to roentgen therapy, there is no way of telling beforehand which cases will. Certainly a cure in from two to six months cannot be attributed to roentgen therapy, because it is well recognized that in many cases the condition will improve spontaneously with the minimum of therapy before that time. Schaer (72) looks upon roentgen therapy with what appears to be a rather sensible point of view. He holds this form of treatment in reserve, so that when other methods of therapy have failed, he may have one final method of attack which may be tried.

Dollinger (22) presents one of the less commonly accepted viewpoints concerning chronic bursitis. He believes the pain and disability arise from an excess strain on the supraspinatus muscle. In the cases of 6 patients all had performed unusual work with the arm in abduction. He notes pain

constant pain, radiation to the insertion of the deltoid is common. Patterson and Darrach (66) have introduced needles into the area of calcification under fluoroscopic control. As soon as the needle was seen to enter the calcified deposit, the patient immediately cried with pain referable only to the region of the deltoid tubercle. They were unable to explain this pain reference but were able to relieve it temporarily by the injection of a small amount of novocaine solution into the calcified area. At times there may be a radiation of the pain down the arm to the fingers, sometimes associated with a swelling and stiffness that gives somewhat the appearance of an arthritis. Carnett (?) believed this pain radiation is due to a brachial neuralgia. Codman terms it a pseudo-neuritis.

On examination, the patient demonstrates a painful 'hitch' (Codman) as the arm is abducted and as the arm is lowered from abduction to the side. This pain point appears at about the time the greater tuberosity passes beneath the edge of the acromion and the patient often learns instinctively to rotate the arm externally to avoid pinching the painful area against the coraco-acromial ligament or the edge of the acromial process. With a longer duration of the painful movements there may develop more or less spasm of the short rotators with what Codman terms an interruption of scapulohumeral rhythm. By this he means that the rotation of the humerus in the glenoid and of the scapula on the chest wall which normally progresses *pari passu* in abduction movements is interrupted by spasm of the short rotators. Scapular motion thus becomes more prominent and humeral motion at the glenoid decreases relatively. Practically all authors mention tenderness over the greater tuberosity on deep pressure as a constant and diagnostic finding.

In younger patients the appearance of calcium deposits in the roentgenogram is quite common. These deposits are usually not so large as are noted in cases of acute bursitis and Ferguson (30) notes that they are more often found lying above rather than along the lateral side of the greater tuberosity in the chronic type of bursitis. Haggart and Allen (38) and many others have pointed out the various degrees of decalcification in the upper humerus and greater tuberosity which are commonly found.

In the older patients calcified deposits may be absent, but there is usually noted decalcification of the greater tuberosity with bony excrescences and eburnation of the cortex. There are often noted also rough excrescences along the edge of

the acromion. In such cases there is frequently an audible and almost invariably a palpable click or crepitation as the patient abducts or lowers the arm. The click usually is noted at the time in the abduction movement when the patient experiences pain. The painful point and the click are not nearly so definite when the arm is raised in the extended position and in some patients this motion may be made without any pain at all (Ferguson).

The treatment of chronic bursitis is by no means well defined if the literature on the subject is any criterion. There seems to be no agreement among authors as to the cause of the symptoms, i.e., of the underlying pathology, hence the many and varied forms of therapy. Several writers believe with Codman that the pain is produced by traumatizing a painful point in the floor of the bursa in abduction movements. This area may be one overlying an area of calcification in the supraspinatus tendon or a bursal villus, or a frayed, buckled up layer of superficial tendon fibers (strap) seen more commonly in older patients.

Codman seems inclined to operate on his cases showing calcification. Ferguson (30) found the calcified areas hard and chalk like, and in spite of complete removal as shown by subsequent roentgenograms little benefit was obtained by operation. Patterson and Darrach (66), on the other hand, feel fairly sure that when the calcium deposits are hard and rock like, radical excision should be the method of choice.

In older patients with a definite click on abduction movements and without calcified areas Ferguson (30) has followed Codman in removing offending villi or straps of loose tendon and in some cases the sharp osteophytes along the edge of the greater tuberosity and acromion. The operation and the subsequent fixation of the arm in abduction appear to have been helpful in relieving the pain and disability. Most writers are inclined to a conservative therapy in chronic bursitis.

Exercises (Figure 1) physiotherapy and, in the more painful cases or those which do not respond, the injection of from 15 to 30 c. cm. of a per cent novocaine into the bursa and adjacent joint capsule is the outline of therapy used by Haggart and Allen (38). Ferguson (30) injects novocaine in those cases which do not immediately respond to heat rest and sedation and especially in those cases with much spasm of the supraspinatus. Patterson and Darrach (66) although they distinctly recommend their needle irrigations for acute bursitis state that irrigation did help a few

rupturing the atrophic short rotator tendons Ellis (25) advises manipulations, first in abduction and then in internal and external rotation. He stops when he feels or hears the first snap, applies hot fomentations and ties the arm to the head of the bed. Repeated manipulations may be necessary.

Ferguson (30) infiltrates the bursa and surrounding tissues with 1 per cent novocaine solution, and then manipulates the arm in a gradually increasing range. Often a general or brachial-plexus block anesthesia is necessary in addition. At times a second or third injection and manipulation may be necessary. When there is an audible or palpable snap with subsequent full range of motion, excellent and almost immediate results are obtained. Usually there is an increase in the pain and soreness in the shoulder for twenty-four hours, which gradually subsides during the next day or two.

Exercises in which the patient abducts or extends the arm are a most important factor in the success of the treatment.

Haggart and Allen (38) employ a similar treatment in their cases of adhesive bursitis with calcification. When there is pronounced atrophy of the upper end of the humerus, they recommend open operation with sharp division of the adhesions and manipulation with the finger in the bursa to protect against rupture of the short rotator tendons.

Hitzrot (46) manipulates the arm and then puts the patient to bed with the arm tied to the head of the bed or held in abduction with a plaster splint. Schaer (72) illustrates a cast dressing (see Figure 4) for holding the arm in abduction and external rotation after manipulation.

The prognosis for "recovery is always sure and may be confidently expected" (Codman 12), but, except in a few cases, the progress is apt to be slow and the period of recovery should be measured in months rather than in days or weeks.

BURSITIS IN GENERAL

There are many contributions in the literature on the etiology and treatment of bursitis which do not permit classification. Some authors are of the opinion that focal infection bears a definite etiological relationship to bursitis. Dickson and Crosby (20) and (Dickson 18, 19), who present an analysis of 200 cases, believe that foci of infection and glandular dysfunction appear to be much more important as etiological factors than trauma, although they admit that it is extremely difficult to evaluate their true significance. In treating their cases, they investigate and remove



Fig. 4 Cast dressing for holding the arm in abduction and external rotation [From Schaer (72)]

all foci of infection in the teeth, tonsils, and prostate. Gordon (34), also, cannot overlook infection as an etiological factor, however indirect the relationship. Mumford (65), too, subscribes to the opinion that focal infection is a causative factor in certain cases of bursitis, he directs treatment to the eradication of foci and gives "vaccines" during the acute period. Albee (1) is of the opinion that many cases of so-called bursitis are in reality cases of myofascitis. He believes that this type of painful inflammatory reaction is due to toxic absorption from either infectious foci or faulty intestinal metabolism, and directs his treatment toward elimination of these sources of toxic absorption.

On the other hand, there are many authors who have failed to note any etiological relationship between focal infection and bursitis. Haggart and Allen (38) point out that most patients in the age group of from forty to sixty years have foci of infection, although they admit that in the occasional case focal infection may aggravate bursal symptoms. They find, as do many others, that the cultures from the bursa are consistently negative, and believe that focal infection should receive appropriate treatment on the basis of proper hygiene, not as cure for bursitis. Ferguson (30), on the basis of an experience with 200 cases, was never able to trace any benefit from the eradication of focal infection. He was not able to trace any definite etiological relationship between bursitis and toxic absorption from foci of infection or

on pressure over the supraspinatus, and treats his patients with forceful finger tip massage over the muscle. This treatment relieves the pain and spasm, but Dollinger admits that in long standing cases with some stiffness, additional physiotherapy is necessary.

It must be admitted that the cases included under the heading "chronic bursitis" are a less definite group than those of the acute bursitis classification. They may progress to become acute or may continue eventually to fall into the chronic adhesive or obliterative bursitis grouping, or the patient may recover completely. In this respect chronic bursitis must be looked upon as a phase of the syndrome which goes under the general term of bursitis or periarthritis. Although it may not be possible to outline any very definite pathological picture as the basis for chronic bursitis, the clinical classification is useful as an aid in determining therapy.

CHRONIC ADHESIVE OR OBLITERATIVE BURSTITIS

The cases included under this heading have been variously classified under the headings tendinitis (Codman 12), 'frozen shoulder,' periarthritis, arthritis, and neuritis. The common characteristics of these conditions are the inability of the patient to move the arm in its normal motions at the shoulder, the marked atrophy of the muscles, and the aching pain in the shoulder region. Most of the patients are over forty years of age, and a high proportion are women.

Haggart and Allen (38) distinguish between adhesive bursitis with and without calcification. Those with calcification have passed through the stage of acute bursitis, during which period the arm has been maintained in the sling position until the acute symptoms subsided. Finally, the patient develops marked atrophy of the peri-shoulder muscles, pronounced loss of motion and a persistent generalized aching discomfort in the shoulder. The patients without calcification usually give a history of slight trauma or more often of overuse of the arm in abduction. They complain of an aching pain usually referred to the region of the deltoid insertion. Often the pain radiates to the arm and hand and upward over the shoulder. Sleeping on the affected side is usually impossible and since the sling position appears to be the most comfortable, it is maintained for long periods. The patients note a gradually increasing inability to abduct the arm or rotate it externally at the shoulder without pain.

On inspection, the marked atrophy of the deltoid and of the spinatus is at once apparent. There

is tenderness on pressure over the greater tuberosity and, in most cases, also along the deltoid as far down as its insertion. Active abduction is limited to from 15 to 30 degrees and is mostly scapular. Passive abduction is also impossible because of an apparent fixation of the structures in the shoulder region. The roentgen picture shows atrophy of the greater tuberosity and adjacent bone and the calcified area may appear in those cases following an acute bursitis.

The underlying pathological lesion appears to be the formation of adhesions between the bursal surfaces, with a consequent functional loss of the gliding mechanism of the bursa. Codman (12) and Haggart and Allen (38) have opened the bursa and observed adhesions and the former describes the marked congestion of the base of the bursa over the supraspinatus tendon.

Almost all authors agree that the adhesive form of bursitis is probably the most difficult of all to treat. The purpose of the treatment is to stretch or rupture the adhesions in the bursa so that the gliding function of the bursa may be regained. After trials with rupture of the adhesions under anesthesia and with open operation Codman (12) now recommends putting the patient to bed. He obtains gradual external rotation and abduction of the arm by applying a splint to the wrist each end of which is tied to the head of the bed. After from twelve to twenty-four hours with morphine sedation, the adhesions usually yield, the tuberosity passes under the acromion, and the arm becomes more comfortable. The patient is allowed out of bed daily for swinging exercises in the stooped position but is kept in bed with his arm abducted until his motions at the shoulder are free in any direction. This usually takes one or two weeks. After he is allowed out of bed the exercises are continued and for a few weeks he sleeps at night with the arm in the hammock position.

Haggart and Allen (38) recommend a similar line of therapy, using positive traction with a Balkan frame apparatus. During this treatment, the arm is progressively manipulated in stages, adhesions being broken up gently and a little at a time. Thereafter intensive physiotherapy, especially exercises is recommended. These authors use novocaine injections to promote comfort during the traction and elevation.

Manipulation of the shoulder under general or local anesthesia has a host of advocates (Dickson and Crosby (20), Codman (12), Hitzrot (46), Haggart and Allen (38), Ferguson (30), Ellis (25) and Reich (69)). Warnings are given against too vigorous manipulations because of the danger of

ruptured there will be an absence of palpable contraction of the supraspinatus. Although there may be an inability to abduct or extend the arm to the horizontal, abduction may be continued if the arm is passively raised to the horizontal. If the patient leans forward, the arms swinging of their own weight may be elevated above the head and held there while the patient rises to the erect position (Codman (12), Ferguson (30), Haldeman and Soto-Hall (39)). This test is easily demonstrable in cases of recent rupture, but Wilson (84) and Codman (12) both point out that inability to raise the arm is not an infallible diagnostic sign, "patients with a rupture of long duration learn certain tricks of using other muscles to compensate for their weakness." However, Wilson points out that a definite weakness can be demonstrated and Codman stresses the fact that the abduction movement is performed with a faulty scapulohumeral rhythm, i.e., the first part of abduction is carried out by a rotation of the scapula followed later by a rotation at the scapulohumeral joint.

In these abduction movements, especially as the arm descends from overhead, there is a decided "jog" and a wince of pain when a point is passed a little below the horizontal, and the arm seems to fall flail-like to the side.

On palpation, there is a tender point on pressure over the greater tuberosity. Codman (12), and Davis and Sullivan (17) have been able to demonstrate a sulcus and an eminence formed by the defect at the insertion of the supraspinatus tendon. The demonstration of this sign depends to a large extent upon muscular development of the patient.

X-ray examinations of the shoulder are usually negative in cases of spinatus tear, but Haggart and Allen (38) point out that in long-standing cases, there is a general atrophy of the tuberosity and upper humerus, and "in addition, the head of the humerus will probably have 'dropped down'—i.e., away from the glenoid due to the insufficiency of the shoulder muscles."

Practically all writers (Haggart and Allen (38), Codman (12), Wilson (84), Fowler (31, 32), Haldeman and Soto-Hall (39), Davis and Sullivan (17)) agree that in cases of complete rupture of the supraspinatus, suture of the divided tendon is the indicated procedure. "If clinical evidence favors tendon rupture, a small exploratory incision is imperative to confirm or disprove the diagnosis" because of the marked disability which may result from neglect. Schaer (72) recommends operation only in cases in which disability persists after conservative (abduction cast) therapy has been carried out.

The technique of the operation varies slightly in different hands. The incision usually recommended is an enlargement of Codman's exploratory incision through the deltoid. In long-standing cases Wilson (84) recommends the sabre-cut incision because it affords the required exposure. The tendon may be sutured to its stump with silk (12), (29), (31), anchored through drill holes to the greater tuberosity with silk (17) or fascia (38), or a groove may be cut at the greater tuberosity into which the proximal end of the tendon may be fixed through drill holes.

After operation the arm is kept in abduction and external rotation for three weeks in a splint (Wilson (84), Ferguson (29)), plaster spica (Davis and Sullivan (17)), or suspension (Haggart and Allen (38), Fowler (31)). Active muscle exercises, massage, and physiotherapy are given for several months after operation. The results of operation are excellent (Codman, Wilson, Ferguson). Early operation permits an easier operative procedure and a more rapid return of normal function. Ferguson's (29) patient operated upon the fourth day after injury returned to work five weeks after operation, and in ten weeks had almost complete range of motion without pain. Davis and Sullivan (17) report 5 cases of early operation and in 3 the patients were able to return to work in from three to four months. The patients operated upon late (Wilson (84), Codman (12), Fowler (31)) have in most cases good functional results but a slower recovery. Codman's series of 38 cases is the largest recorded. In 23 of these cases the results were good, in 6 fair, and in 5 poor, 4 cases could not be followed up.

INCOMPLETE RUPTURE OF THE SUPRASPINATUS TENDON

Incomplete rupture of the supraspinatus tendon is a classification of Codman (12) based on the practical prognostic and therapeutic finding that partial rupture of the tendon may heal with conservative measures while patients with complete rupture will not recover without suture of the tendon. Anatomically, the incomplete rupture may be vertical, without involving the whole breadth of the tendon, or it may be horizontal, a tearing of some of the fibers on the upper or lower surface of the tendon. Codman is of the opinion that these incomplete tears of the tendon often are precursors of other lesions involving the tendon and bursa, viz., calcified deposits and tendinitis. They occur in approximately the same type of patients as complete tears, perhaps at a slightly earlier age on the average, and the symptomatology is approximately the same except that the

from the colon. Schaer (72) is of the same opinion, although he believes that the changes in the bursa and tendon may be a *locus minoris resistentiae* in which an infection or toxic absorption may light up already established changes. Polmer (67) looks upon bursitis as primarily traumatic in origin and does not believe that allergy or toxic or infective factors are of etiological significance.

The subject of bursitis cannot be dismissed without some reference to the general metabolic factors which may play a part in the etiology. This has been stressed by Dickson and Crosby (20), whose experience with several patients with hyperthyroidism and "peri-arthritis" has been truly remarkable. Patients who did not respond to the usual forms of therapy were markedly relieved of their symptoms in from two to three days after thyroidectomy. They point out that the investigation should include a general metabolic survey for thyroid disturbances and diabetes and that the treatment should be directed toward setting right any abnormalities discovered. A high vitamin and low carbohydrate diet and heliotherapy are effective therapeutic methods. Tiegel (78) outlines a similar course of therapy in which he includes daily enemas.

RUPTURE OF THE SUPRASPINATUS TENDON

To Codman belongs the credit of emphasizing the importance of rupture of the supraspinatus tendon as a cause of shoulder disability. He distinguishes between the partial ruptures, which are more frequent and complete ruptures, which are less frequent but more disabling.

By complete rupture of the supraspinatus tendon is meant a complete transverse tear through all of the fibers of the tendon the floor of the bursa lying over it and the roof of the joint capsule on its under surface. The tear occurs close to the insertion of the tendon on the greater tuberosity and through it the bursa communicates with the cavity of the shoulder joint. This lesion usually occurs in individuals over fifty years of age although Wilson (84) reported one patient as young as thirty five years. The incidence increases with age in the studies of Hayes (53). It occurs more often in men. In Codman's series of 100 cases he found only 8 per cent in women.

Many authors Hayes (52, 53) Skinner (75) Codman (13), and McMaster (62), believe that a complete rupture is always preceded by a degenerative process in the tendon. Local areas of ruptured tendon fibers without adequate repair defects produced by calcified deposits or attritional changes

Codman's description of the signs and symptoms of a complete rupture of the supraspinatus tendon has proved so exact that practically every writer on the subject has simply added confirmation. He describes the typical patient as a laborer over forty years of age who had no symptoms in the shoulder prior to the accident. Then following an adequate injury, usually a fall the patient experiences a brief sharp pain, with loss of power in elevating the arm. The injury is usually one in which the patient attempts to abduct the arm suddenly against the resistance of a heavy object in the hand or the arm is suddenly pinned to the side as the patient tries to throw out his arm as a protection in a fall. The immediate pain at the time of injury is sharp and often associated with a snap. There is usually an interval of several hours between the injury and the development of the lasting pain and discomfort in the shoulder. The pain usually becomes so marked during the night after the injury that a doctor's assistance is sought. Codman looks upon the pain as arising from distention of the joint and bursa with hemorrhage and from secondary muscle spasm. The pain may never be severe enough to make the patient stop work and he may go for several weeks with the injury unrecognized until continued loss of power in abduction makes him seek medical aid. Ferguson (39), and Davis and Sullivan (17) who have seen recent cases of spinatus rupture, have remarked about the relatively slight amount of pain on shoulder motion during the first few days after injury.

On examination there is demonstrated an inability to raise the arm especially in abduction. Codman sounds a warning that the examiner must distinguish between an inability to raise the arm due to a lack of supraspinatus function and an unwillingness to raise the arm because of pain produced. Haldeman and Soto-Hall (39) attempt to make this differentiation more easily by injecting from 15 to 20 c. cm. of 1 per cent procaine into the bursa. They have found that the anesthesia reduces pain and sets muscle spasm at rest so that if supraspinatus function is present it may be clearly demonstrated. Codman is able to differentiate between inability and pain by noting the degree of deltoid contraction. Fowler (32) describes a very useful method of testing for spinatus tear. The patient rests his shoulder on a crutch or chair back so that the shoulder is elevated 2 or 3 in. and thereby relaxes the trapezius. He then tries to abduct the dependent arm while the examiner's fingers rest on the relaxed trapezius over the supraspinatus muscle belly. If the tendon is

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symptoms are less pronounced 'The diagnosis is made chiefly by the persistence of a considerable amount of power in the elevated or abducted arm and some doubt about the presence of some of the other symptoms and signs'

The chief importance of differentiating partial from complete tears of the spinatus tendon is due to the difference in treatment. Conservative therapy by fixation of the arm in abduction with a splint (Haldeman and Soto-Hall (39)) or in a plaster dressing (Schaefer (72) see Figure 4) for from four to six weeks offers the best chance for a cure. There are no figures available as to results of treatment in these cases because the diagnosis is presumptive and is not confirmed by operation.

In considering tears of the supraspinatus tendon, attention should be drawn to a somewhat similar lesion accompanying dislocation of the shoulder. Greeley and Magnuson (35) have pointed out that in many dislocations there may be a fracture of the greater tuberosity with a pulling away of the insertion of the supraspinatus or a rupture of the tendon. They point out the necessity for accurate reduction if the tuberosity is displaced, and for exploratory operation if signs of spinatus tear are present. In cases showing these injuries they dress the patient in abduction and external rotation for six weeks.

CONCLUSION

This five year survey of the literature on the diseases of the subdeltoid bursa and supraspinatus tendon serves to show that there are many points as yet unsettled in the diagnosis and treatment of these lesions. In cases of acute bursitis and of complete ruptures of the supraspinatus tendon the clinical picture is fairly clear cut and the therapy usually successful. In the other lesions the differential diagnosis is somewhat more difficult for the reason that several of them may be combined or follow one another so that the history is by no means clear and the findings may fit into several diagnoses. In spite of these facts a careful physical examination will usually permit the examiner to obtain a fairly clear clinical impression upon which his diagnosis and treatment may be based.

The knowledge that adequate treatment almost invariably results in a complete cure should encourage persistent and sympathetic care of patients with these disabling lesions.

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SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES JOINTS MUSCLES TENDONS, ETC

Busch K. F. B. Familial Disseminated Osteosclerosis. *Leto radial* 1937, 18 693

The author presents 15 additional cases of familial disseminated osteosclerosis 14 of which were in one family distributed over three generations. Twenty-five cases were previously reported in the literature as *ostitis condensans generalisata*, *osteopathia condensans disseminata*, *osteosclerosis fragilis generalisata*, *osteopikilosis*, and "potted bones".

The author believes familial disseminated osteosclerosis is a true primary benign osseous affection with generalized systemic symmetrical localization. It is probably the result of embryonal malformation occurs familiarly, is inherited dominantly, and must be considered as a constitutional anomaly. It is characterized by the presence in nearly all parts of the skeleton of numerous rounded, oval or sometimes striate opacities ranging usually from 2 to 5 mm in size with the longest axis parallel to the longitudinal axis of the bone. The sclerotic spots are most numerous in the epiphyses and metaphyses of the long tubular bones and decrease in numbers as they approach the diaphysis the center of which is rarely involved. They are numerous in the bones of the

hands and feet in the scapulae and particularly in the pelvis in the region of the acetabulum. Few spots are found in the clavicles, ribs and vertebrae and none are present in the bodies of the vertebrae or in the skull. The number of the opaque spots may vary in different cases but they are always homogeneous and well-defined.

Pathologically these dense areas consist of bone trabeculae lying in normal osseous tissue without producing a reaction in the osseous tissue. The characteristic roentgenological picture is due to these small circumscribed patches of sclerosis in the bone tissue. The changes in the bones can be diagnosed roentgenologically in the second or third year of life when the osseous structure has become sufficiently developed to produce shadow. The opacities become more numerous, larger and denser with advancing growth then appear to remain stationary until they are involved in the general senile atrophy of the bones or lose some of their density independently of the latter.

Disseminated osteosclerosis seems to be an innocent anomaly in so far as it does not give rise to any pathological conditions in the individual except an occasionally associated asymptomatic disseminated lenticular dermatofibrosis which is characterized by disseminated round or oval lentil sized lightly elevated sharply circumscribed yellowish white infiltrate in the cutis resembling ordinary fibromas of the skin and is symmetrically distributed in various parts of the body especially over the buttocks and thighs.

Pathological examination shows a hyperplasia of the connective tissue not of a tumorous nature which has no inflammatory reaction. The hyperplasia involves all layers of the cutis and the upper layer of the subcutis. The elastic fibers are well preserved.

The cutaneous manifestations were present in 6 of the 15 new cases of disseminated osteosclerosis presented and although the cutaneous changes were not as constant as the changes in the skeletal system they appeared to be familial and hereditary.

The author has shown that disseminated osteosclerosis is familial and hereditary and has accordingly termed the anomaly familial disseminated osteosclerosis.

He has presented evidence showing that the origin was not of an infectious or endocrinous nature and believes that the so-called compact tissue island (*Kompaktinseln*) and disseminated osteosclerosis have no relation to each other.

Reference is made to work indicating that ischemia of the bones causes sclerosis in the ischemic area and that during early life the arteries of the long tubular bones are end arteries. It is possible to imagine the anomaly disseminated osteosclerosis being due to a hereditary malformation consisting



Fig. 1. Female F. 32. Aarhus Family.

of an abnormal constriction of the end-arteries, with resulting ischemia and sclerosis

ROBERT P. MONTGOMERY, M D

Ribbing, S.: Hereditary Multiple Disturbances in the Epiphyses (Studien ueber hereditaere multiple Epiphysenstoerungen) *Acta radiol* 1937, Supp 34

Of 23 persons examined, including the parents of a male patient, their 14 children, their 5 grandchildren, and 2 children of the grandfather from a second wife, there were 6 (4 males and 2 females) who showed pronounced multiple skeletal changes localized in the epiphyses and short bones. In the extremities, at least, these disturbances were bilateral, even though they were not always symmetrical in details. Of the other individuals examined, some showed less marked deviations from the normal skeletal pictures. The changes observed could be interpreted as different stages of the same disease, even though slighter variations occurred than those due to the difference of age.

The subjective symptoms began at the ages of seven to thirteen years. In 3 cases symptoms appeared first in the hip joint, and in 2 of these, almost simultaneously, in the knee joints as well, in 1 case, simultaneously in the foot and knee joints, and in 1 case first in the phalangeal joints. Later many joints were involved, and most often symmetrical joints were involved simultaneously. Symptoms occurred in the back also. The symptoms were always stiffness and pains, which increased with work and decreased with rest.

The general status of the patients revealed no pathological symptoms. The patients were strong, well built, and without any signs of endocrine or metabolic disturbances. The objective symptoms in the joints were not prominent. Two of the older patients showed a thoracic kyphosis, and patients near the twentieth year and older presented a limitation of motion in the hip joints, especially in rotation. On movement of the joints crepitation sometimes occurred. The phalangeal joints, when affected, were swollen, especially over the heads of the bones, there was also an abnormal mobility in the form of lateral instability.

In comparison with the few and non-specific symptoms, the roentgenographic signs indicated more abundant, pronounced, and often characteristic signs of hereditary, multiple epiphyseal disturbances. This might be called a chiefly "roentgenological" disease. In some cases definite destruction of the epiphyses, in others anomalies and anatomical variations, such as split or irregular centers of ossification and pseudo-epiphyses, are observed. The lesions produce skiagrams more or less identical with those of certain recognized pathological types: atypical achondroplasia and cretinism, or the local changes of the bones may simulate osteochondritis dissecans, coxa plana, dorsal juvenile kyphosis, and hallux rigidus. In certain areas there is marked similarity, and in others a more or less indicated similarity, to aseptic necrosis of bone.

The prognosis must be made with the greatest care, as the behavior of the condition after the twenty-sixth year is not known. At any rate, with less arduous work the patient's condition was found to improve markedly. With increasing age, the patients will probably suffer from symptoms of arthritis deformans, as the roentgenograms of the older patients already showed changes of this type. A change of occupation is indicated.

As to the cause, the author believes this condition to be due to constitutionally weak epiphyses. Roentgenography reveals anomalies in the form of excessive accumulations of irregular, spongelike bone centers, pseudo-epiphyses, and abnormal free islands of bone, from which it may be assumed that they lie free in the hyaline cartilage. In the subsequent development, the structure of the bone nuclei becomes more uniform, the borders of the pseudo-epiphyses are closed, and a part of the bone islands unites with the adjacent bone. During this time, however, the abnormally ossified parts of bone have not been able to meet the demands to which they are exposed, and destruction results.

The question of heredity was investigated but the material was found inadequate. The condition is not due to surroundings or harmful influences during fetal life. It may therefore be assumed to be hereditary. The parents of the patients were fifth cousins and the ancestors of the parents had lived in one community. Theoretically, the condition is due to a recessive gene, which develops as a mutation and accidentally attains a certain distribution. It is also possible that there are unconnected skeletal disturbances having nothing to do with the other changes. It may also be the expression of a heterozygosis of the anlage. The disease may be due to several factors of a modifying character, even though the chief effect may originate in a single gene.

LOUIS NEUWELT, M D

MacNeal, W. J. The Infectious Organism in Osteomyelitis. I. The Bacteriology of Bone Infection. II. Bacteriophage and Serum Therapy. *J Bone & Joint Surg*, 1937, 19 886, 891

The author presents experimental evidence from several workers showing that the staphylococcus aureus is the cause of more than one-half the cases of osteomyelitis. Other bacteria that may cause osteomyelitis are the staphylococcus albus, streptococcus hemolyticus, pneumococcus, typhoid and paratyphoid bacilli, tubercle bacillus, spirochete of syphilis, and, rarely, other bacteria, such as the meningococcus.

The staphylococcus aureus may cause an albuminous periostitis, a subacute osteomyelitis, a sclerosing non-suppurative osteomyelitis, a bone abscess which may heal spontaneously, a recidivous osteomyelitis after an interval of twenty years or more, and a primary osteomyelitis of adults, as well as the more common acute osteomyelitis of children.

Hematogenous osteomyelitis occurs as a result of the growth of bacteria which have reached the in-

terior of the bone by being transported through the blood stream

Localization of the disease process depends upon diminished resistance at particular sites associated with growth activity at the metaphysis or with trauma at any site. In the absence of trauma the marrow of the shaft is relatively resistant to infection because of the efficiency of its endothelial cells in the phagocytosis and destruction of bacteria. Bacteria injected into the blood stream lodge in abundance in the bone marrow of the shaft but in this location the bacteria are destroyed, while they are able to survive in the metaphyses.

If purulent foci in bone are of embolic origin the embolus coming from a thrombophlebitis at the primary site of infection one might expect that the infected emboli would be caught in the pulmonary capillaries before reaching the bones. Pulmonary abscesses are absent in human osteomyelitis, and usually absent in experimental osteomyelitis.

Foreign particles in the blood do not just settle where the current is slow but they are actively phagocytosed in the spleen, the liver and the bone marrow. Intravenous injection of India ink into rabbits caused the visible mucous membranes to become dark almost immediately but these bleached out again in about ten minutes. When the animals were killed after forty five minutes the liver, the spleen and the entire bone marrow were intensely black, while the other organs showed no macroscopic changes although a few pigmented thrombi were found in them microscopically. In the liver the spleen and the marrow the ink particles were largely phagocytosed within the endothelial cells. In the marrow the capillary endothelium was full of ink particles, and wandering cells lying on the capillary walls were full of the particles. These ink deposits were always found in the venous capillaries and never in the terminal arterioles. Always the marrow of the metaphysis contained less ink than the marrow of the shaft. However at the curve of the capillary loop in the metaphysis there were clumps of ink particles without efficient phagocytosis. These observations require the consideration of biological factors of tissue resistance rather than a mere mechanical explanation for the common localization of bacterial infection at the metaphysis of growing bone. It seems significant that the spleen, the liver and the shaft marrow in which early accumulation and phagocytosis of circulating foreign particles and bacteria are most abundant are locations which escape the later abscesses while the metaphysis of growing bone and the renal substance are the favorite sites for abscess formation.

A consideration of the bacteriological relationships indicates the wisdom of a conservative attitude in dealing with acute hematogenous osteomyelitis.

The overwhelming invasion of the blood stream by virulent staphylococci from an active suppurating focus must be regarded as a general infection in which the painful spot in a bone is merely one localization of minor importance a situation in which

the patient is fighting for his life and will only be further depressed and endangered by ill-considered incisions and drillings. When the infection of the blood stream has been of a milder character so that it has been overlooked and the suppurating focus in the metaphysis has appeared following strain, local trauma, or some other depressing experience the infectious agent is usually of diminished virulence and the host resistance relatively high. There is little excuse for the panic which results in hastily considered operations on these patients.

Operative interference is often undertaken too early rather than too late and the answer to the problem may not be the earliest possible surgical invasion of the bone but a well timed adequate drainage of the medullary canal when the individual's resistance is at the highest possible point.

In the second part of this paper the author presents measures for combating infection in contrast to the local measures of incision and drainage. The bacteriophage phenomenon as observed in bacterial culture the technique of preparation of the material for use in animal experimentation and in human disease the effect of these bacteriophage agents in animals and their effects when administered intravenously to patients with osteomyelitis are discussed. Photographs of patients' photomicrographs roentgenograms and a detailed case history are presented.

The filterable agent of transmissible bacteriolytic causes solution of the respective bacteria in a watery culture media. The bacterial cells tend first to swell and then quite suddenly burst and pass into solution. Such cultures in liquid media furnish the usual bacteriophage preparation which is employed for further experimentation in laboratory cultures and in therapy.

In the circulating blood of the living animal the bacteriophage preparation fails to cause solution of the bacteria but exerts an opsonic effect leading to more efficient phagocytosis of the bacteria by the endothelial cells of the liver and spleen and a more prompt intracellular digestion of the phagocytosed bacteria. A photomicrograph demonstrating the mode of bacterial transport in the blood stream shows staphylococci within polymorphous neutrophil leucocytes of the circulating blood. The author has been unable to identify any staphylococci free in the blood plasma.

Transmissible bacteriolytic agents bring aid to the body defenses in overcoming infection with the staphylococcus not only in furuncles carbuncles and septicemia but in lesions of staphylococcal osteomyelitis.

ROBERT F. MONTGOMERY, M.D.

Sussal L. New Therapeutic Measures in the Surgical Treatment of Acute Osteomyelitis (Nuovi orientamenti terapeutici nel trattamento chirurgico di Ba osteomielite acuta). *Polichin*. Rome 193 44
see p. 1321

Sussal describes the clinical and anatomic-pathologic features of acute osteomyelitis and states

that early diagnosis and the localization of the lesion are difficult in view of the fact that the roentgenograms taken early are characteristically negative and drilling of the bone often gives negative results as it yields no pus but usually a serosanguinous material in which there may be found large quantities of microorganisms

Under the toxic and necrotizing action of the organism, the bone softens within a few days and the purulent material finds its way to the subperiosteal spaces. This phase is called the abscess stage. Some surgeons believe that this stage represents the height of the infection and advocate surgical interference at this time but not before. The results obtained from this procedure are by no means inferior to those obtained from more radical methods such as drilling of the bone.

It is indeed surprising how much diversity of opinion exists among surgeons concerning surgical treatment of acute osteomyelitis. Some physicians are opposed to surgical treatment, others advocate only incision of the abscess after a preliminary conservative stage, and a third group interferes surgically at a very early stage.

Sussí firmly believes that premature surgical interference is fraught with considerable danger because thrombi may be mobilized and organisms may be transferred into territory in which the natural mechanism of defense has not been established as yet. The usual complications are pulmonary infarcts and pyemia. Radical surgical intervention should be withheld in very acute cases and in the so-called septicemic form of osteomyelitis in which drilling of the bone constitutes a very dangerous trauma. It is better to wait until the process has localized itself so that the patient's natural forces of defense may be increased.

Since 1934 Sussí has employed Loehr's method with excellent results. The intervention is made when the abscess stage is reached and the operation is performed under general anesthesia. After a tourniquet has been applied at the root of the limb, a long incision is made over the region of the abscess. The purulent material is drained and the abscess cavity is filled with a paste containing equal parts of vaseline and cod-liver oil. The wound is closed with interrupted stitches, loosely tied, and the limb is immobilized in a plaster cast for two weeks. In the majority of cases the temperature drops immediately or after a few days. From the wound there is an abundant drainage which penetrates through the plaster cast without macerating the skin. Because of the closed method, however, an offensive odor is produced. This may be prevented by fenestrating the cast. After two weeks the roentgenogram reveals usually the presence of compact bone, and sometimes there is necrosis with the formation of sequestrum which is generally not extensive and does not have to be removed surgically. The author interferes only if the elevated temperature persists or if there is pain with the presence of fistulous tracts. In these cases, Sussí opens the bone-marrow cavity

to allow the pus to escape, or he performs a sequestrectomy, limiting himself exclusively to the removal of the sequestrum without removing the surrounding granulation tissue.

Sussí treated 16 cases of acute osteomyelitis, of which 10 involved the tibia, 4 the femur, and 2 the radius. Only 1 patient died because of the development of septicemia and bilateral bronchopneumonia. Two of the patients presenting an extensive necrosis of the bone were treated by trephination, whereas the others were treated in the forementioned way. Twelve patients recovered within from twenty-five to sixty-five days, and in 1 case the patient had to be operated upon again.

The advantages of using cod-liver oil are (1) the prevention of desiccation of the tissues, (2) the stimulating action on the tissue caused by Vitamins A and D present in the oil, (3) the bactericidal action of the oil, and (4) the maintenance of continuous drainage.

RICHARD E. SOMMA, M.D.

Connolly, A. E.. Osteitis Tuberculosa Multiplex Cystoides and Sarcoid Lesions *Brit J Radiol*, 1938, 11 25

Two cases of osteitis tuberculosa multiplex cystoides and one case of sarcoid disease, lymphogranulomatosis benigna, are reported with a survey of the literature, and roentgenograms showing the bony alterations over long periods in each case.

Tuberculosis osteitis, characterized by multiple cyst-like areas in bone, is the rarest form of tuberculosis and shows a marked tendency to spontaneous recovery. There is no specific treatment. The efficacy of roentgen therapy and arsenical preparations is open to doubt, because this tendency to spontaneous improvement is characteristic.

Published cases by various authors have established the occurrence of cyst-like changes in tuberculosis bone disease. The term "cystoides" has been given preference over the word "cystic" in designation of these bone changes.



Fig 1 Cystoides



Fig 2 Cystoides

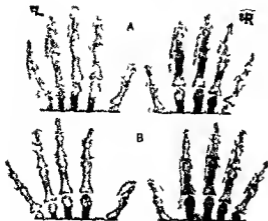


Fig. 3 Sarcoids

The bone lesions are pseudocystic areas of granulomas which replace the bony tissue and may expand or perforate the cortex. These pseudocystic bone changes are frequently associated with tubercloid manifestations in the skin in the sarcoid type. Two orders of change may occur in these osseous lesions viz caseation with fibrous proliferation and tubercloid granulation tissue leading to bone absorption without any tendency to caseation. The long bones of the hands and feet are most frequently involved. Sequestrum formation periosteal reaction and involvement of joints are rare.

The tuberculous etiology in the cystoid type has been accepted. The etiology in sarcoid disease is unknown. It appears to be an infectious granuloma, occupying a place between tuberculosis and leprosy. The probability of a tuberculous etiology is accepted by many authoritative observers.

The two cases of osteitis tuberculosa multiplex cystoides presented were chosen because one showed wide spread bony involvement with collateral intra thoracic disease and the biopsy report confirmed the clinical diagnosis and the other showed an unusual site for the lesion. Five thoracic vertebral bodies were involved with the cyst like changes and there was an associated fusiform perivertebral abscess arising from the primary lesions in the sixth and seventh thoracic vertebrae.

ROBERT P. MONTGOMERY M.D.

Dayton C. and Balser B. H. Myeloma and Its Neural Complications. *Arch Surg* 1937 35 913

The spinal cord and nerve roots are the most frequently involved in neural complications of myeloma which almost constantly affects the vertebrae.

A myelopathic process which interferes with the conduction of neural impulses results from pressure by the invading neoplasms on the spinal cord or by the diseased vertebra on the vessel of the spinal cord. The root pain herpes zoster or peripheral neuritis results from direct pressure on the nerve

roots the spinal ganglia and the peripheral nerves. Mental symptom and other signs of cerebral involvement are rarely noted although the bones of the skull are frequently affected.

Twelve cases are reported in which neural signs and symptoms were noted secondary to cranial or vertebral lesions. The usual location was in the thoracic region but the lumbar vertebrae were also involved. Involvement of a single vertebra was not noted and laminectomy did not give relief in all cases. However pain was most frequently diminished by treatment with a high voltage current.

In the cases with vertebral involvement the clinical findings were those of local vertebral tenderness, severe pain which was relieved by recumbency and compression of the cord and roots. Most of the patients were in the fifth and sixth decades of life. The occurrence of the disease was twice as frequent in the male as in the female.

ELLEN J. BERKHEIMER M.D.

Toro N. Biochemical and Histological Alterations of Muscles Subjected to Mechanical Immobilization. (*Alterazioni biochimiche ed istologiche dei muscoli sottoposti ad immobilizzazione meccanica*). *Sperimentia* 1937 91 373

In a previous publication the author discussed the water content and dry residue of muscle which had been subjected to mechanical immobilization. In comparison with normal muscles it was found that in immobilized muscle there was a diminution of the water content and a corresponding increase of the dry residue within certain limits.

This paper is a report of the study of the oxidative and glycolytic changes in immobilized muscle. The technique of the experiments is given in detail. Animals were studied after from four to sixty days of immobilization of muscles. There seemed to be a variation in the dehydrogenizing properties in the early days there was less dehydrogenization on the affected side than on the normal side in the later periods considerably more. The author attempts to correlate these findings with those reported by other investigators. He believes that the early diminution is the result of complete sudden lack of muscle action whereas the later augmentation of oxidation results from chemical changes which occur with advanced atrophy as associated with disintegration of the muscle which process requires considerable oxygen.

Experiments were also done in which the glucose content of the blood of the femoral artery and vein of the immobilized and normal sides was determined. During the first fifteen days of immobilization there was less sugar in the venous blood of the immobilized extremity. After longer periods of immobilization there was somewhat more sugar in the venous blood of the immobilized extremity. In some experiments there was little or no difference. Apparently the absorption of glucose is diminished in muscle which has been atrophied for a long time.

A. LOUIS POST M.D.

Meyer, A. W.: Chronic Functional Lesions of the Shoulder. *Arch Surg*, 1937, 35 646

The word "chronic" is used in a literal sense and entirely without implication of any disease. The lesions considered are not caused by the extraordinary use to which the upper extremity is put, but are caused by ordinary often repeated everyday use, that hour by hour, day by day, month by month, year to year show more clearly their effect. The shoulder may be adapted perfectly to the uses for which it was intended but certainly it is not perfectly adapted to the uses to which it is put. Slight trauma recurring in the same place for hours, days, weeks, or months has a cumulative effect and may produce great changes. These changes were seldom noticed before the third decade of life. Changes due to disease have been excluded and the effects of normal use alone are considered. The lesions are distinctly quantitative rather than qualitative. The lesions described deal alone with the shoulder, but they may well occur in similar locations throughout the body.

The lesions considered here are fraying and destruction of the bursa, fraying and destruction of articular capsules, fraying and partial or complete division or detachment of the tendons, partial or complete erosion of the ligaments, partial or complete dislocation of the long tendon of the biceps, thinning and complete local destruction of the articular cartilages, fraying and destruction of the muscles, polishing and eburnation of bony surfaces, and considerable loss of bone from wear in the area of bony contact. In considering this large variety of lesions around the shoulder joint practically every bone, cartilage, ligament, muscle, bursa, and capsule, has been studied and found to have been involved to some degree in some cases.

The author states that when one does a synovectomy one does not remove a membrane but merely destroys the innermost portion of the connective tissue of an articular capsule. Thirteen bursae are said to be associated with the humeroscapular articulation. The areas of most intimate and frequent contact always are the first to show change.

From practically normal to practically completely destroyed capsules have been observed.

The long tendon of the biceps usually shows wear, and over a period of time becomes thinner and thinner and more frayed. An extremely thin tendon will rupture upon the slightest provocation, severe trauma not being necessary.

Fraying, thinning, and final destruction of a part or the whole of the width and the thickness of the distal portion of the tendon of the supraspinatus muscle are affected from without or above.

The central area of the articular cartilage of the head of the humerus not infrequently shows the effect of wear. Gross and microscopic examination of a considerable series of specimens yielded no evidence of the presence of chronic inflammation.

The author has found the tendon of the supraspinatus muscle to be extremely strong and rigid

and very unlikely to be torn except by a severe, direct trauma. The muscle itself has been found to give away first rather than the tendon, which is much stronger. The fact that longitudinal tears and trabeculae are found instead of transverse tears leads to the assumption that these lesions are of long standing rather than acute trauma.

The presence of marked atrophy in the supraspinatus muscle has been found only a few times in cadavers and could not therefore be used as a diagnostic sign of rupture of the tendon as has been implied by other authors. This holds true also with respect to the subscapularis and the infraspinatus muscles and the lateral belly of the biceps muscle. It is believed that the tendons are divided gradually because the nerve supply of the muscles is intact and the muscles can respond and continue to contract against some resistance. Since the tendons must yield gradually when weakened by wear they may obtain secondary attachments before being completely divided. A spontaneous dislocation of the long tendon of the biceps dorsally over the greater tuberosity has never been seen by this author.

Many observations, findings, and statements of other authors are questioned, discussed, or thought to be wrong. The author, however, does not state frankly that they are wrong because he states that he was not there to see the conditions present which the other authors had described.

This paper covers a great deal of territory, very thoroughly, and gives evidence of a great deal of work in the dissecting room. Evidently our bodies begin to wear out during the third decade, and wear and tear on the body cannot be doubted after reading this very thorough paper.

RICHARD J. BENNETT, JR., M.D.

McLaren, J. W.: Disability of Workers Using Pneumatic Drills. *Lancet*, 1937, 233 1296

A certain number of workers who operate pneumatic drills have always complained that their use caused "dead hands," attacks of blanching and numbness in the fingers with loss of power. The onset of symptoms is gradual and more noticeable in cold weather. The common finding is a blanching or cyanosis of the fingers, usually symmetrical. Should the blanching last for twenty minutes or longer the finger tips become anesthetic and a real disability is produced as the man has no power to carry out the finer movements of the hands. The incidence of this condition increases in proportion to the number of years the worker has used the machine. In 1936, Hunt found that these workers exhibit a typical Raynaud's syndrome.

The author investigated 3 groups of workers who have used these pneumatic machines. The first group of 20 men used a machine which makes 2,300 strokes a minute. All the men had the typical circulatory changes although the severity varied considerably. All were examined roentgenologically. Thirteen showed definite changes in the bones of



Fig 1

the wrist and hand. This incidence of 65 per cent was very high. The typical changes found were the formation of 'bone cysts'—areas of localized absorption of bone occurring in the carpal bones and heads of the metacarpals. The most frequently affected bones were the semilunar or magnum scaphoid and the metacarpal heads of the second and third fingers.

The second group of 10 men had used machines of varying size and periodicity. Eleven of this group

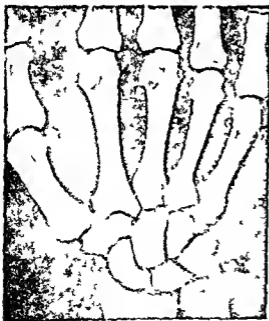


Fig 2

Figs 1 and 2. Disabilities of workers using pneumatic drills.

complained of the usual circulatory changes. The hands of 5 were examined roentgenologically and 3 showed changes.

Four of the third group of 6 cases showed changes.

There was only slight improvement when the men were changed from this type of work. The bone changes are always a potential danger of pathological fracture.

As regards treatment there is no definite proof that resilient pads worn on the hands avert this condition although some employers require the use of them. The author describes a method of introducing histamine into the affected hands by means of an electric current. This temporarily produces edema and hyperemia of the hands. The treatment diminishes the number of daily attacks of blanching of the hands even when the temperature is low.

HARVEY S. ALLEN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Leveuf, J., and Bertrand, P. A New Procedure for Arthrodesis of the Shoulder. Fixation Buttreux by a Tibial Graft. (Un nouveau procédé d'arthrodèse de l'épaule. L'enchevêtrement bûte au moyen d'un greffon tibial.) *J. de chir.* 1935 30 593.

Leveuf and Bertrand note that it is difficult to obtain a satisfactory ankylosis of the shoulder as is indicated by the numerous methods that have been proposed for this purpose. They use a graft from the crest of the tibia which both maintains fixation and gives support. The graft is 7 cm. in width and thickness and approximately 12 cm. in length, the exact length depending on the size of the patient.

An arthrodesis by decortication is first done by the usual technique, then a tunnel is formed for the tibial graft which is placed across the inferior surface of the spine of the scapula and the head of the humerus just below the greater tuberosity. The inner end of the graft is pushed under the inner insertion of the infraspinatus muscle. In exposing the field care was taken not to section the insertion of the inner portion of this muscle. The graft may be sutured to the spine of the scapula by wire or by chromic catgut. The arm is immobilized for forty-eight hours and then a plaster cast is applied. This is worn for six months and may be renewed during that period.

This technique was first used by the authors in February 1935. It has been used either to complete the usual arthrodesis by decortication or to consolidate a fibrous ankylosis resulting from an attempted anterior arthrodesis or from prolonged immobilization in a plaster cast in tuberculous arthritis. In 6 cases which have been followed up for a considerable period the end results have been very satisfactory. In cases followed up for 12 months or more the tibial graft almost completely disappeared at its two extremities where it was in contact with the head of the humerus and with the spine of the scapula, but its middle portion formed



Figs 1 and 2 Tuberculous Arthritis of the Shoulder Fig 1 Fixation-Buttress, radiogram two months after operation Fig 2 The same six months after operation, showing the formation of a mass of bone of which the graft is the center

the center of a solid mass of bone which united the head of the humerus, the glenoid cavity, and the spine of the scapula

ALICE M MEYERS

Browne, D. Modern Methods of Treatment of Club-Foot *Brit M J*, 1937, 2 570

The author believes in the mechanical cause of classical talipes equinovarus, mainly on the basis of deductive reasoning. Arguments in favor of this hypothesis are (1) position of the normal fetus before birth, (2) position and range of movement of the feet in the newborn infant, (3) occurrence of "pressure dimples," varying according to degrees of pressure, position of the limbs, and their absence in arthrogryposis, (4) mutual "die and imprint" deformities, (5) correspondence of the shape of the feet with the position of the joints of the legs, in different types of talipes the invariable difference between the degree of deformity in bilateral cases corresponding to the greater pressure on the outer leg, (6) variation of the states of joints and muscles with the degree of pressure as shown by the severity of the deformity and extent of the dimpling, (7) the greater frequency and severity of molding of the feet as compared with the molding of the hands, (8) explanation of arthrogryposis in terms of hydraulic pressure, with strong confirmation from a disease of sheep, and (9) the analogy of lumbar spina bifida, associated with hydrocephalus, developing from pressure before the spinal cord has formed.

Treatment in the infant is considered imperfect unless by slightest pressure full calcaneovalgus, the fifth toe touching the outer side of the leg, is obtainable. Browne advocates obtaining full correction at the first manipulation. He believes that gradual "coaxing" permits the foot to give at its weakest point, the tarsometatarsal junction, and leaves the center of deformity unaffected. In the after-treat-

ment, the same forcing of the foot into calcaneovalgus is the one and only manipulation necessary. The author uses a splint of his own design, which depends on the mechanical principle that it is possible to control the position of one foot by means of the other. Splinting is carried out with no interruption despite reactionary swelling, pressure sores, or skin irritation. Infants can be corrected at four or five months of age, after which night boots of the same pattern are worn. Browne reserves surgery for bones only, as he believes that soft tissues, which have elastic recoil, should be left untouched and unstretched.

JEROME G FINDER, M D.

Brockman, E P.: Modern Methods of Treatment of Club-Foot. *Brit M J*, 1937, 2 572

The author reiterates his belief in his hypothesis that congenital club-foot is due to a congenital dislocation of the head of the astragalus, caused by an atresia of the socket into which the head of the astragalus normally fits, the deformity, therefore, is due to an intrinsic and not an extrinsic cause. He has given up the multiple manipulation under anesthesia with plaster immobilization in infants in favor of Browne's method. However, he concedes that several manipulations may be necessary before the Browne splint can be applied, but thereafter progressive correction ensues with little muscle wasting or hardening. He advises against division or elongation of the Achilles tendon because it leads to irreparable muscle wasting without adding to the correction. He is more pessimistic regarding relapsing club-foot after his open operation than he was when he first advocated it. Another late result of the operation is the thickening of the mid-tarsal portion of the foot and a tendency for a persistent equinus to remain. This causes no disability but gives the foot an ugly appearance. Those relapsed

feet explored subsequent to open operation revealed filling in of the midtarsal and subastragaloid joints with fibrous tissue which bound the opposing surfaces of the bones together, with little if any movement in the joints. This type of foot always remains rather stiff. Other methods failing, the bone operation of choice is triple arthrodesis.

JEROME G. FIDLER, M.D.

Fitzgerald F. P. and Seddon H. J. *Lambrinudi's Operation for Drop Foot*. *Brit J Surg*, 1917, 25: 283.

Lambrinudi first described his operation in 1927. The present article is a review of the results of the operation in a series of 24 cases.

Technique. The same approach is used as for triple arthrodesis. The foot must be completely dislocated medially at the subastragaloid joint. The medial surface of the astragalus is then cut carefully with a saw following a preliminary plan as described. The upper surface of the os calcis is cut horizontally with a broad chisel. The calcaneocuboid joint is then excised and a triangular piece removed from the inferior proximal aspect of the scaphoid which forms a slot in the latter bone. The raw surfaces of the os calcis and astragalus are then brought together to permit an arthrodesis. The cut edge of the scaphoid is hooked over the anterior superior edge of the neck of the astragalus. A preliminary planning of the operation is most important for the amount of bone to be removed will depend on the amount of shorten-

ing in the leg. A tracing on paper should be made from a lateral roentgenogram of the foot in full plantar flexion. The heel is cut out in one piece and the front of the foot (excluding the astragalus) in another. Then two horizontal lines are drawn one representing the ground and the other above it representing the amount of shortening. The paper pieces representing the foot bones are then arranged on these lines to determine how much bone should be removed to permit the ball of the foot to touch the ground line and the heel to remain on the upper line where in the actual foot after operation, it will be supported by a heel lift.

Indications for operation. Although Lambrinudi advised against this operation in a complete flail foot the authors report 21 cases of flail foot in which the procedure was done with good results except when lateral instability at the ankle joint developed later. In brief the indications are (1) paralysis of dorsiflexors and peronei (2) when the patient is able to control the knee without a full length brace (3) when it is desirable that the calf muscles should be active although this is not essential and (4) the patient should be at least eleven years old.

Comparison with other methods. Astragalectomy is a more mutilating operation and shortens the leg which may be already too short and the result may be irreparably unsatisfactory because of painful arthritis. Campbell's bone block introduces a block which is anatomically foreign to the ankle and which for its efficiency depends upon how much the free fragments introduced regenerate into living bone. Triple arthrodesis does nothing to limit flexion at the ankle joint.

Results. Among 8 cases in which the calf muscles were active, the results were satisfactory in 6, questionable in 1, and unsuccessful in 1. Of 15 cases of flail feet 7 showed good results, 3 fair and 1 a partial failure. In 5 cases with active calf muscles and peronei there was one partial failure and success in 4 cases.

Causes of failure. In 5 cases lateral instability developed chiefly because of the fact that the scaphoid was not placed accurately over the beak at the anterior margin of the neck of the astragalus. Fusion in this position results in an internally rotated foot in relation to the leg and a varus position of weight bearing.

Although the operation is usually done for disabilities following poliomyelitis it has been done also following injury of the peroneal nerve for drop-foot of hemiplegia and for old imperfectly corrected club foot. WILLIAM ARTHUR CLARK, M.D.

FRACTURES AND DISLOCATIONS

Kernwein G. *The Effect of Starvation on the Healing of Fractures in Rabbits*. *Arch Surg* 1937 35: 493.

In this paper the author presents the results of experiments on the healing of fractures in rabbits undergoing acute starvation. In 61 adult rabbits

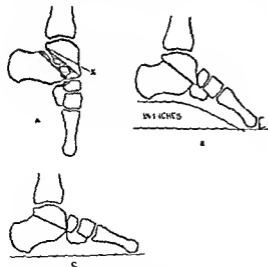


Fig. 1. A Tracing from a roentgenogram taken with the foot in full plantar flexion. The shaded area indicates the amount of bone to be removed in order to obtain satisfactory locking at the ankle when a lift of 1 1/2 in. is required. B The same foot after operation. C The same foot made to lock at a few degrees below the right angle. The only difference in the planes of bone section is in the astragalus where the bone should be divided at X.

the ulna was fractured by open operation and the animals were then divided into two groups, one of which was fed the usual laboratory diet, the other given nothing but a solution of 0.9 per cent sodium chloride. As the rabbits of the second group succumbed, control animals were killed at corresponding intervals and the specimens studied with the roentgen-rays and the microscope. The starved animals survived from nine to thirty-seven days.

The author found that the healing of a fracture was definitely inhibited by starvation. The process of healing was normal during the stage of the formation of a fibrous callus. However, in animals that survived this stage there was definite retardation of ossification of the callus, which became more marked with an increase in the length of the survival period. Generalized osteoporosis gradually developed, and in the animals that survived longest there was some osteoporosis in the callus that had previously ossified.

BARBARA B STIMSON, M D

Lippmann, R. K.: *Laxity of the Radio-Ulnar Joint Following Colles' Fracture*. *Arch Surg*, 1937, 35 772

The author makes a brief survey of the recent literature to show that symptoms referable to the radio-ulnar joint and deviations of the ulna are fairly frequent sequelæ of Colles' fracture. He feels that these symptoms are due primarily to damaged radio-ulnar ligaments sustained by the original trauma. He reviews the anatomy of the radio-ulnar joint and in experiments on cadavers finds that section of the articular disk plus partial section of the distal radio-ulnar ligament increases the degree of laxity of the radio-ulnar joint. The position of supination reduces any displacement of the ulna and approximates any torn edges of the radio-ulnar ligament. The author believes that in order to prevent the symptoms of pain particularly associated with resisted pronation complete reduction of the fracture is of great importance. If instability at the joint is discovered after the reduction has been accomplished, the forearm should be placed in full supination and so maintained for a period of from three to four weeks. In cases where laxity of the radio-ulnar joint persists for more than four months the author advocates open repair of the dorsal radio-ulnar ligament and capsule while the ulnar head is pressed tightly against the radius. He believes that the subperiosteal resection of the ulnar head is necessary only in those cases in which there is gross bony distortion.

Diagrams and roentgenograms illustrate the article.

BARBARA B STIMSON, M D

Steiner, G.: *Isolated Fractures of the Vertebral Arch*. *Am J Roentgenol*, 1938, 39 43

Isolated fractures of the vertebral arch are quite rare. To facilitate their recognition it is necessary not only to observe gross deformities of the bone but also to look for fracture lines and changes due to fracture in the vicinity of the arch. It is necessary to differentiate fracture lines from appearances that in some cases may closely resemble fractures and which are not of traumatic origin. Correct interpretation necessitates thorough study of the pedicles, the interarticular portions, the articular processes, and the lamina, and investigation of those parts not only with the usual lateral and oblique projections from both sides but also with a roentgenogram to show the sagittal plane.

Six cases are described in detail and illustrated by roentgenograms to demonstrate some of the findings to which the author attaches particular importance in the recognition of such fractures.

ADOLPH HARTUNG, M D

Eliason, E. L., and North, J. P.: *Fractures of the Shaft of the Femur*. *J Am M Ass*, 1937, 109 848

The authors present an analysis of 74 cases of fracture of the femoral shaft of which 87 per cent were followed. Twenty-four of the patients were over sixteen years of age. Various methods of treatment were used.

The authors believe that the essentials of satisfactory reduction in fractures of the femoral shaft are the restoration of accurate length and approximate alignment, because abnormality in the length of the bone was responsible for most of their unsatisfactory results. Simple closed methods of treatment will give good results provided fundamental principles are observed. The traction apparatus should be mechanically sound, the pull must be uninterrupted, with sufficient force to meet the needs of the individual case, and must be constantly supervised and maintained until firm union has occurred. Traction with adhesive tape on the thigh was found to be least effective. Skeletal traction was much more satisfactory. Russell and Bryant traction were each effective in 41 per cent of the cases in children, but Russell traction was satisfactory in only 25 per cent of the adult patients. In the series perfect functional results were obtained in 92 per cent of the children, and 64 per cent of the adults. Operative reduction was done in 14 per cent of the children and 32 per cent of the adults, which the authors believe is unnecessarily high.

BARBARA B STIMSON, M D.

feet explored subsequent to open operation revealed filling in of the midtarsal and subastragaloid joints with fibrous tissue which bound the opposing surfaces of the bones together with little if any movement in the joints. This type of foot always remains rather stiff. Other methods failing the bone operation of choice is triple arthrodesis.

JEROME G. FISHER, M.D.

Fitzgerald F. P. and Seddon H. J. *Lambrinudi's Operation for Drop-Foot* *Brit J Surg* 1937, 25: 283

Lambrinudi first described his operation in 1927. The present article is a review of the results of the operation in a series of 24 cases.

Technique. The same approach is used as for triple arthrodesis. The foot must be completely dislocated medially at the subastragaloid joint. The medial surface of the astragalus is then cut carefully with a saw following a preliminary plan as described. The upper surface of the os calcis is cut horizontally with a broad chisel. The calcaneocuboid joint is then excised and a triangular piece removed from the inferior proximal aspect of the scaphoid which forms a slot in the latter bone. The raw surfaces of the os calcis and astragalus are then brought together to permit an arthrodesis. The cut edge of the scaphoid is hooked over the anterior superior edge of the neck of the astragalus. A preliminary planning of the operation is most important for the amount of bone to be removed will depend on the amount of shorten-

ing in the leg. A tracing on paper should be made from a lateral roentgenogram of the foot in full plantar flexion. The heel is cut out in one piece and the front of the foot (excluding the astragalus) in another. Then two horizontal lines are drawn on representing the ground and the other above it representing the amount of shortening. The paper pieces representing the foot bones are then arranged on these lines to determine how much bone should be removed to permit the half of the foot to touch the ground line and the heel to remain on the upper line where in the actual foot after operation, it will be supported by a heel lift.

Indications for operation. Although Lambrinudi advised against this operation in a complete flail foot the authors report 11 cases of flail foot in which the procedure was done with good results except when lateral instability at the ankle joint developed later. In brief the indications are (1) paralysis of dorsiflexors and peronei, (2) when the patient is able to control the knee without a full length brace, (3) when it is desirable that the calf muscles should be active although this is not essential and (4) the patient should be at least eleven years old.

Comparison with other methods. Astragalectomy is a more mutilating operation and shortens the leg which may be already too short and the result may be irreparably unsatisfactory because of painful arthritis. Campbell's bone block introduces a block which is anatomically foreign to the ankle and which for its efficiency depends upon how much the free fragments introduced regenerate into it. A bone block Triple arthrodesis does nothing to limit flexion at the ankle joint.

Results. Among 8 cases in which the calf muscles were active the results were satisfactory in 6, questionable in 1 and unsuccessful in 1. Of 11 cases of flail feet 7 showed good results, 3 failures and 1 a partial failure. In 5 cases with active calf muscles and peronei there was one partial failure and success in 4 cases.

Causes of failure. In 5 cases lateral instability developed chiefly because of the fact that the scaphoid was not placed accurately over the beak at the anterior margin of the neck of the astragalus. Fusion in this position results in an internally rotated foot in relation to the leg and a varus position of weight bearing.

Although the operation is usually done for disabilities following poliomyelitis it has been done also following injury of the peroneal nerve for drop-foot of hemiplegia and for old imperfectly corrected club foot. WILLIAM ARTHUR CLARK, M.D.

FRACTURES AND DISLOCATIONS

Kernwein G. The Effect of Starvation on the Healing of Fractures in Rabbits. *Arch Surg* 1937 15: 492

In this paper the author presents the results of experiments on the healing of fractures in rabbits undergoing acute starvation. In 61 adult rabbits

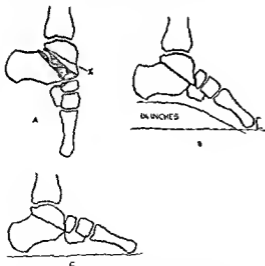


FIG. 1. A. Tracing from a roentgenogram taken with the foot in full plantar flexion. The shaded area indicates the amount of bone to be removed in order to obtain satisfactory locking at the ankle when a lift of 1 1/4 in. is required. B. The same foot after operation. C. The same foot made to lock at a few degrees below the right angle. The only difference in the planes of bone section is in the astragalus where the bone should be divided at X.

perfect anatomical results, another 24 patients had no symptoms, but, objectively, several small hemorrhoidal masses were present. In 18 there was considerable recurrence without symptoms, and in 18 there was recurrence with symptoms. Therefore, 6 per cent may be added to the percentage of cure, which leaves 10 per cent as the percentage in which failure occurred. The injection method used in America and the very popular Langenbeck operation carry very little danger, but the possibilities of recurrence are materially greater.

Of the 110 patients with varicocele, 97 were treated by resection through an inguinal incision with simultaneous repair of co-existent hernia, in 13 patients, the scrotum was resected in addition. Of the 35 patients who were followed, 31 were cured anatomically, but only 23 were entirely free from symptoms. Two complained of slight discomfort and 1 of loss of potency. On the other hand, 2 reported increased potency. Atrophy of the testicle was found in 4. There were, therefore, cures in 89 per cent and testicular atrophy in 11 per cent. From the experiences of the Clinic, bilateral resection of the veins of the cord or any other procedure necessitating transplantation of the cord is contra-indicated. Inasmuch as the symptoms of varicocele improve after a certain age and even spontaneous cure may occur, and since, with conservative treatment, definite improvement may be obtained, the author considers operation permissible only in those cases that resist all other treatment, or when the life of the patient is unbearable unless he is operated upon. Scrotal resection combined with a simple Bassini operation is very safe and effective. In sexual neurotics the operative indications must be very cautiously weighed. The injection treatment is still in the experimental stage, and is dangerous.

(ILL'S) LEO M. ZIMMERMAN, M.D.

Homans, J. Venous Thrombosis in the Lower Limbs: Its Relation to Pulmonary Embolism.
Am J Surg, 1937, 38 316

Thrombophlebitis is on the increase, and it seems as if advances in the care of patients in bed had increased rather than lessened the risk of thrombosis and embolism. While similar processes occur in the heart, in the cerebral sinuses, in the portal system, and elsewhere, in the discussion reported herewith, attention is directed to thrombophlebitis in the lower half of the body.

The process of thrombosis begins as a deposition of blood platelets upon the wall of the vein. From these a sponge-like structure is built out into the current in which red and white cells become engulfed, soon occluding the vessel. When this soft thrombus extends toward the heart, unfixed in the vein and waving in the current of an entering branch, its end is readily torn free from its base to become an embolus. It is a peculiar quality of thrombosis that it develops most readily in a slow current.

The author notes three influences that lead to thrombosis: (1) those affecting the wall of the vein,

(2) those altering the nature of the blood, and (3) those which slow the circulation, generally or locally. In the type of thrombosis under consideration in this report, there is evidence that an initial change in the wall of the vein is not essential and in many cases is very unlikely to be present. The series of events observed in some instances of thrombophlebitis has pointed to an irritating lesion about both the vein and accompanying artery. A lesion such as a deep perivascular lymphangitis might be the initial event in such cases.

Disorders of the blood take the form chiefly of dehydration. This may result from vomiting, diarrhea, hemorrhage, and sweating at the operating table. Another disorder of the blood is associated with trauma, whether in the nature of a crush or fracture or a deliberate surgical operation. This is not well defined at present.

Retarded venous return may be due to general circulatory failure, to cardiac weakness plus local venous stasis, or to local venous stasis alone. The anatomical peculiarities of the upper femoral and iliac veins are another unfavorable thrombophilic influence. The eddies and cross-currents due to many entering vessels and the peculiar relation of the great veins to the arteries alike encourage thrombosis.

Of the several varieties of thrombophlebitis, the author mentions the following: (1) deep femoro-iliac thrombophlebitis, or phlegmasia alba dolens, (2) deep peripheral thrombophlebitis among the muscles of the calf, (3) thrombophlebitis in varicose veins, and (4) thrombophlebitis in the superficial veins. Among these deep peripheral thrombophlebitis has received little attention, probably because it is clinically so silent and because pathologists too seldom search the great venous plexuses among the muscles of the lower leg for a cause of fatal pulmonary embolism. When the individual lies or even reclines in bed, the clinical signs of a deep thrombosis in the muscles of the calf may be entirely lacking. There is another sort of deep thrombosis which is thought to be a source of embolism but about which little is known. This occurs in the deep pelvic plexuses, about the prostate and bladder in the male and in the uterine veins and pampiniform plexus in the female. Such a process may remain local or may extend into the common iliac vein.

In pulmonary embolism the author notes that prevention is of prime importance, first, the prevention of thrombosis and, second, the treatment of established thrombosis in such a way as to lessen to the utmost the probability of embolism. Active exercises for the feet, knees, and hips for from five to ten minutes at least twice a day are effective in maintaining a better circulation and preventing muscle atrophy. Abdominal wounds should be so carefully repaired that tight straps and binders are not needed. Prompt restoration of intestinal tone, by the early use of semi-solid or solid food, acts to prevent increased intra-abdominal tension. Care in handling the abdominal viscera at the time of opera-

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Dos Santos R. The Technique of Aortography (Technique de l'aortographie) *J. internat. de chir.*, 1937 21 609

Dos Santos employs the aortic route both for the injection of an opaque medium for roentgenographic study and for the injection of therapeutic solutions such as serums and antiseptics. In roentgenographic diagnosis the injection of the opaque medium into the aorta shows the entire arterial and even venous vascularization of the abdominal and pelvic circulation. In treatment the injection of drugs and serums into the aorta brings such substances directly and in high concentration to the diseased areas in all types of abdominal or pelvic infection.

Puncture of the aorta is usually a relatively simple procedure—often more simple than lumbar puncture. A needle 12 cm. in length with an external diameter of from 1.2 to 1.5 mm. with a guide, is employed. The needle is introduced a fingerwidth to the left of the median line just below the twelfth rib; it is pushed through the muscle tissue and directed toward the twelfth dorsal vertebra. The point of the needle will touch this vertebra and it should be directed forward in order to avoid its entering the spinal canal. The guide is withdrawn and the direction of the needle changed slightly so that it enters the prevertebral space; the point is then near the aorta. If the needle is then pushed forward a little it enters the aorta after overcoming a slight resistance. When the needle is in the aorta, blood comes out in small rhythmic jets.

Then either the opaque medium for roentgenography or a therapeutic substance may be injected. For his first roentgenographic studies with puncture of the aorta the author used sodium iodide as the opaque medium; he has since tried many of the substances used in urography such as uroselectan and abrodil in high concentration. Uroselectan B has usually given satisfactory roentgenograms but sodium iodide gives the best contrast. It may not, however, be so well tolerated as uroselectan and other urographic media on account of its high iodine content. Roentgenograms in series may be made with the use of a special apparatus and the course of the opaque medium may then be followed from its injection into the aorta to its entrance into the venous circulation.

In making over a thousand punctures of the aorta the author has never seen any ill effect from this procedure per se. A few accidents have resulted from the toxicity of the opaque medium employed. There were 4 deaths in the series 2 of which resulted from the use of a sodium iodide preparation which was impure and which was immediately discarded. One death occurred in a patient with amyloid degeneration of the liver and kidneys because of

anuria. Uroselectan was used in 1 fatal case of multiple abdominal tumors. In all the cases death was to be attributed to the solution used and not to the puncture of the aorta. There were in addition 6 patients with hepatic insufficiency presenting severe symptoms of iodism. *Lance* 21 1937

Dorák E. Operative Results in Varicose Vein Syndromes (Operativergebnisse der Symptomgruppe mit Krampfadern) *Orvosi hetil.* 1937 848

In the Verébely Clinic in Budapest during the fifteen years from 1919 to 1934 operation was done in 517 cases of varicose veins. 862 cases of hemorrhoid and 110 cases of varicocele. Follow up examination was made in 182 cases of varicose veins, 356 of hemorrhoid and 35 of varicocele. The shortest interval following operation was two years. Varicose veins were treated as conservatively as possible operation being done only in severe cases. The Madelung operation was done in 29 cases. Avulsion ligation in 215 simple ligation in 9 combined Kusmik and simple ligation in 1. The Rüdtesch operation in 2 and operation combined with injection in 3. The Madelung method was modified in recent years for cosmetic reasons by resection through multiple small incisions instead of one long one.

Most of the operations were done under novocain spinal anesthesia, 33 being done with local infiltration. Because a large proportion of the injected anesthetic fluid immediately escapes and because anesthetization is done by section, there were no reactions despite the large quantities of novocain used. In 46 patients there were disturbances in wound healing. Two patients died of pulmonary embolism and in two there were non-fatal pulmonary emboli.

Of the 182 patients who were re-examined 115 (65 per cent) were entirely free from symptoms and anatomically cured. In 36 there were venous dilatations beyond the fields of operation which caused no material symptoms. If these patients are added to those cured the total amounts to 85 per cent. In 10 per cent there were mild and in 5 per cent there were severe recurrences.

Hemorrhoids in general were treated conservatively. Severe cases were operated upon by the Whitehead method. This method offers the best protection against recurrence. In prematurely aged persons, particularly those with hypertension or diabetes the Whitehead method is contra-indicated. Inflamed hemorrhoids should be operated upon only if necrosis threatens. Anal eczema should be treated before operation. Tabetics are unsuitable for operation. Of the 867 patients operated upon 5 healed secondarily. There were 4 deaths, 1 each from embolism and suppurative of a peri rectal hematoma and 2 from pneumonia. Of the 386 patients re-examined 84 per cent were symptom free and had

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Brocroft, F. W., Stanley-Brown, M., and Chargo, E.: Postoperative Thrombosis and Embolism. *Ann Surg*, 1937, 106 868

The authors concede that physical factors accepted by most workers as the cause of postoperative thrombosis, are correct. namely, dehydration, stasis, infection, and trauma. Yet they believe that there must also be some biochemical change in the blood which precedes and accompanies thrombophlebitis and embolism, as all of the physical factors may be present without the occurrence of a thrombosis. Therefore they have sought and, in a certain measure, found simple and accurate methods of quantitative analysis for the various coagulating and anti-coagulating factors in human blood.

They have developed a simple and accurate method of determining the potency of heparin, which is the only inhibitor of blood clotting which has been recovered from the human body in a relatively pure state, and which may be identical with antithrombin. They have established a unit of heparin potency which is defined as, "the smallest amount of inhibitor which will raise the blood clotting time of 0.1 c cm. of chicken plasma four times its normal value under carefully controlled experimental conditions." They have not, however, evaluated the figures of human heparin content from the standpoint of the bleeding tendencies of patients.

In analyzing the factors of blood clotting they have found only two of importance, fibrinogen and prothrombin. Of the former they state that over 0.8 gm. per 100 c cm. of blood is "significant of a tendency toward phlebitis associated with a definite infection." The prothrombin test, which they term the "plasma-clotting index," varies to a marked degree in both the bleeding and clotting diseases. The latter is more indicative of clotting tendencies when infection is at a minimum, while the fibrinogen, when high, suggests infection and the likelihood of a thrombophlebitis. Calcium and thromboplastin do not appear to be significant in the evaluation of clotting tendencies. Since 1934 the authors have routinely examined patients pre-operatively, and five and nine days postoperatively in the light of the above tests, believing that the fifth and ninth post-operative days represent the danger periods.

In every case the postoperative care was directed toward (1) reduction of postoperative nausea and vomiting and the avoidance of any pressure of dressings upon the femoral vein, especially when the patient lay upon the Gatch bed, (2) early exercise of the extremities to prevent venous stasis, (3) the prevention of distention, and (4) the prevention of dehydration. When the blood fibrinogen or the plasma-clotting index was high, either pre-opera-

tively or postoperatively, the patients were placed on a carbohydrate and fluid diet, with limitation of fats and proteins. In addition to this, the authors advised the use of sodium thiosulphate administered intravenously.

Two separate series of cases are reported. One series of 920 cases was examined and 12 per cent showed high clotting indices. Of these 48 cases, 28 were treated with sodium thiosulphate. There were no deaths in this group, but one thrombosis and embolism developed. To this second series, 242 cases have been added with 30 patients showing high clotting indices. Seventy per cent of the latter were given treatment with only 1 accident occurring in the group. In the two groups of this series, totaling 575 cases, there were 7 accidents in the untreated group, 1 of which was fatal.

WILLIAM C. BECK, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Smith, R. M., and Manges, W. F.: Roentgen Treatment of Infection from Human Bite. *Am J Roentgenol*, 1937, 38 720

The authors have used roentgen irradiation in the treatment of patients with human bite infections. They report uniformly good results in 9 cases. This method of treatment does not interfere with surgical therapy, which is commonly used.

Infections resulting from human bites are likely to be serious. It is difficult to clear up such infections because of their invading nature, the low resistance of the fascia, bone, and tendons, and because the entrance wound is small. The infecting organism is an anaerobe, which is difficult to grow in cultures. The authors believe that the effect of roentgen irradiation on the organism causing human bite infection is similar to that which is produced on the organisms causing gas gangrene.

In the treatment of human bite infections, superficial irradiation is administered over a large area. Each dose is from 50 to 100 roentgens, and may be repeated daily or weekly, the interval between treatments depending on the patient and his reactions. Relief from pain is usually prompt and lymphangitis, when present, responds fairly rapidly.

The period of convalescence, in the patients whose cases are reported, was shortened to from one to two weeks.

HARVEY S. ALLEN, M.D.

ANESTHESIA

Eversole, U. H., Sise, L. F., and Woodbridge, P. D.: The Clinical Use of Cyclopropane. *Anes & Anal* 1937, 16 241

Anesthesia is easily induced with cyclopropane, unconsciousness occurring in from one to two

tion is important and the maintenance of proper fluid balance is of value

In the treatment of established thrombosis, the various types require different management. The deep thromboses should be placed in one group the superficial in another. Since thrombosis is favored by a slow current in the treatment of deep thrombophlebitis the more briskly venous blood can be passed into the main channel proximal to the thrombus the less likely is a propagating thrombus to form. If possible, the leg or legs should be elevated above the body and for at least part of the day the foot of the bed should be raised above the head. Massage can help little and may harm the tissues. When the leg appears normal following the acute stage of phlegmasia alba dolens a semi-elastic bandage should be applied and guarded exercise in the standing position given.

In the treatment of deep peripheral thrombophlebitis a great difficulty lies in the impossibility of measuring the full extent of the process and of deciding whether a propagating thrombus is present. If evidence points to the presence of a propagating thrombus the femoral vein should be ligated distal to the profunda to prevent embolism.

Whether or not the process of thrombophlebitis in normal superficial veins behaves like a true migrating thrombophlebitis the patient should be kept in bed for a few days with the foot higher than the head. When the thrombosis disappears a semi-elastic bandage should be applied and the patient should make an attempt to get about. Although many cases of thrombophlebitis in varicose veins respond well to ambulatory treatment there are some which clearly require elevation of the leg followed by high division or even excision.

HENRY F. THURSTON, M.D.

BLOOD TRANSFUSION

Filator A. N. The Advantages and Disadvantages of Transfusion with Stored Blood (O dostoinstvach i nedostatkakh metoda perekrivaniya konservirovannoi krovi) *Vestnik Khirurgii* 1937 51 191

This paper is a survey of experiences during the years 1932 to 1936 inclusive in the clinical department of the Research Institute of Blood Transfusion in Leningrad, Russia. The first attempts to use stored blood for transfusion were made during the World War mostly with debrinated blood. This method was discarded later and it was not until 1930 that a very detailed study was published by Belenki in Baku. He used citrated blood which had been kept in cold storage.

With his findings as a basis the problem was taken up by several institutes of blood transfusion in Soviet Russia. At the end of 1936, already many thousands of transfusions with conserved blood had been performed in these institutes. Since 1933 other therapeutic institutes in Leningrad made use of the method and the prejudices against it were slowly conquered. Its fundamentals had been thoroughly studied before by many authors. The changes in the various blood elements induced by time were made clear. It was found that the most important factors the power of oxygen adsorption by the erythrocytes and the hemoglobin content decreased only very slowly particularly during the first five days which are considered the safe period for stored blood. The utmost time limit for practical use was fifteen days and that only when the blood was used in the same place where it had been prepared.

Developing a better technique from year to year the Institute in Leningrad was able to reduce the deterioration of the stored blood by premature hemolysis or by contamination so that the proportion of material lost by deterioration was only 1.3 per cent in 1936. The most severe rules of asepsis and accuracy had to be followed during preparation and the material had to be scrutinized very carefully for its fitness before use. This latter task was the hardest one. It was no wonder that during the first years the method was considered dangerous because of the high percentage of unfavorable and even lethal consequences. These severe reactions have now disappeared altogether. Transfusion with stored blood has become as satisfactory as all other methods.

There are some very obvious advantages in using stored blood: the convenient readiness of the blood supply for emergency cases; the possibility of transporting the blood over long distances by car, railroad or airplane which has been established by the experiments of the Moscow Institute. Their recommendation is to fill the containers completely, to exclude the air. Another precaution is to avoid overheating when the blood is warmed up for use. Blood storage permits a wider blood supply, e.g. blood may be obtained from the placenta. Finally, stored blood allows a greater variation in dosage than is possible with a donor. Very large doses may be given without surpassing the donor's capacity or very small doses may be administered for hemotherapy for which it would not pay to call a donor. It is necessary only to have the sealed bottles ready in every size that may be in demand. The already extensive use of this method in Russia is bound to increase with the growing routine and safety of blood conservation.

HILENE LAPOWSKI, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Johnson, C R : Pelvimetry by Stereoroentgenometry. *Am J Roentgenol*, 1937, 38 607

The author employs the cross-thread method of localization first described by Sir J. Mackenzie Davidson in 1898 and later recommended by Manges in 1911 for determining the diameters of the pelvis and the fetal head. Stereoscopic films are made of the pelvis with a longitudinal shift of $2\frac{1}{2}$ in. A special marker is attached to the film tray and a metallic object of known length placed on the patient above and to the right of the symphysis. An exposure of 30 ma-sec at 85 kv (peak) is stated by the author to be sufficient for the average case. The amount of irradiation delivered to the skin will be about 10 roentgens.

The films are studied in the stereoscope and the following structures identified: promontory of the sacrum, the sacro-iliac joints at the pelvic brim, the region of the iliopectineal eminence on both sides, the upper margin of the symphysis pubis, tip of the sacrum, inner margins of the tuberosities of the ischii, and the points on the fetal head. After these landmarks are identified the films are superimposed according to the shadows of the special marker on the right side of the films and the exposed spots at either end punched out. The inner margin of the marker shadows is kept in an exact superimposed position and with a needle, holes are punched through both films simultaneously at the points identified in the stereoscope. The films are then placed on the stereoroentgenometer with the holes in the shadows of the special marker over the pegs on the right side of the instrument. In this manner the films are automatically fixed in a position similar to that occupied in the Porter-Bucky tray and in identical relationship to the origin of the cross-wires of the instrument as to the two positions of the tube.

The following diameters are determined: conjugata vera, right and left obliques, bischial, the posterior sagittal diameters of the outlet and the diameters of the fetal head, usually the suboccipitobregmatic and the occipitofrontal. To determine the conjugata vera the tips of the dividers with the wires attached and crossed once are placed on points marked on the sacral promontory and the point at which the wires cross will be the exact location in space with relation to the film of the promontory of the sacrum. This point is established with the adjustable pointer. The upper margin of the symphysis is likewise located and the distance between the two pointers measured with a rule. This will be the conjugata vera. The other diameters are determined in a similar manner.

Since the diameters given in the textbooks are based on measurements of dried pelvises, the author

determined the measurements of 50 patients who had spontaneous deliveries without evidence of cephalopelvic disproportion. The measurements are summarized in Table I.

TABLE I.—SUMMARY OF 50 CASES WITH SPONTANEOUS DELIVERY

	Maximum	Minimum	Average
Conjugata vera	15.5 cm.	10.4 cm.	12.1 cm.
Right oblique	15.0 "	12.0 "	13.0 "
Left oblique	15.0 "	11.7 "	13.0 "
Posterior sagittal	10.2 "	5.5 "	7.4 "
Bischial	13.3 "	10.0 "	11.5 "
Sum of P S and B I.	22.2 "	17.1 "	18.9 "
Suboccipitobregmatic.	10.0 "	8.5 "	9.2 "
Occipitofrontal	12.0 "	10.0 "	11.0 "

The author examined 453 cases for cephalopelvic disproportion and these are summarized in Tables II and III.

TABLE II — SUMMARY OF 453 CASES EXAMINED FOR CEPHALOPELVIC DISPROPORTION

	Group I	Group II	Group III	Total
Normal	178	89	40	307
Abnormal	98	31	17	146
Total	276	120	57	453
Percentage abnormal	35	31	31	32

TABLE III — ABNORMALITIES OF THE PELVIS

	Group I	Group II	Group III	Total
Flat	12	1	.	13
Scoliotic		1		1
Kyphotic	2	1		3
Chondrodystrophic	1			1
Spondylolisthetic	1			1
Congenital dislocation of hip	3			3
Generally contracted	14	3	5	22
Funnel	31	12	8	43
High assimilation	7	8	2	17
Fused coccyx	1	1	1	3
Naegle	3	1	1	5
Coxalgia	2			2
Pohomyelitis	1			1
Wide symphysis	3			3
Fracture	9	2		11
Spina bifida	1			1
Osteoma	1			1
Short transverse	6	1		7
Total	98	31	17	146

Group I consisted of 276 cases which were seen at the City Maternity Service of Los Angeles City and the Obstetrical Service of the Los Angeles County Hospital, group II consisted of 120 cases from the private practice of experienced obstetricians in Los Angeles, and group III consisted of 57 cases from the physicians in general practice in the vicinity of

minutes. There is no stimulation of the respiration caused by it. Cyclopropane is a potent drug the average anesthetic concentration being about 25 per cent which allows for an adequate oxygen supply but it has a relatively low toxicity. For these reasons Eversole, Sise and Woodbridge find few contra indications to its use. They think it is particularly advantageous for obstetrical procedures for operations in which moderate relaxation is desired for intratracheal anesthesia for supplementing other anesthetics both general and spinal and for cases in which an abundance of oxygen is desired.

The signs of depth of anesthesia are roughly parallel to those of other inhalation anesthetics. The chief toxic effect seems to be a temporary disturbance of the heart usually evident only under the deeper stages of anesthesia. However experimental workers agree that fatal concentrations produce respiratory failure prior to circulatory failure.

Cyclopropane is an inflammable gas and is explosive in anesthetic concentrations. Consequently it should be used in a closed system with the carbon dioxide absorption technique and precautions should be taken to prevent the occurrence of electrical sparks.

ELIZABETH M. CRANSTON

Eltorm H. Additional Experiences in 450 Evipan Sodium Anesthetics with a Prolonged Time of Injection. (Weitere Erfahrungen bei 450 Evipan natrium Narkosen mit verlängerter Injektionszeit). *Ugeskr. f. Læger*, 1937 p. 757.

The results in 450 evipan sodium anesthetics with a prolonged time of injection with regard to the compatibility of the patient and the course of the operation were considered so good that the author believes that this type of anesthesia deserves further use and trial. It was used in all sorts of operations even in serious laparotomies. Only in 20 cases were the results of the anesthesia considered as not entirely satisfactory and only in a few cases was it necessary to resort to ether anesthesia either because the cannula was not kept free from coagula or because no suitable vein could be found. With the addition of a little ethyl chloride near the end of the evipan sodium narcosis the latter could be easily lengthened from five to ten minutes. In about 5 per cent of the cases muscular twitching was observed in the beginning of the anesthesia and in about 1 per cent postanesthetic states of excitement were observed mostly in younger persons. In these cases rather large doses of morphine were necessary. Postanesthetic vomiting also appeared in about 1 per cent

of the cases. The patients complained of a feeling of seasickness. No cases of immediate anesthetic fatality occurred.

The author recommends a large primary anesthetic dose up to 15 or 16 c. cm. In younger persons up to thirty years of age however the author prefers ether anesthesia. Older persons on the other hand bear the evipan sodium anesthesia surprisingly well. The longest period of anesthesia was one hundred and twenty minutes during a gastric resection for carcinoma in a man sixty nine years of age. The contra indications are liver insufficiency and patients between the ages of fifteen and thirty years. Evipan sodium anesthesia is indicated especially in the presence of infections of the respiratory passages in which an inhalation anesthesia might be dangerous. The injection is best given into the cubital vein. A sufficiently deep sleep can be reached after five minutes. At the beginning of the anesthesia the single injections of from 1 to 2 c. cm. should be given more often than later. Operations on the skin, extremities and genital organs require a deeper anesthesia than for example laparotomies. Post operative complications were not observed by the author.

(HAAGEN) LOUIS NEUWELT M.D.

Radian I. S. Accidental Death from Local Anesthesia (Todesunfälle durch die Lokalanästhesie). *Rev. med. leg.* 1937 p. 155.

The author reports two cases in which death occurred during local anesthesia.

In the first 15 c. cm. of a 2 per cent solution of novocaine were employed for anesthesia in a hemorrhoid operation. Four minutes after conclusion of the injection convulsions and suffocative attacks occurred followed ten minutes later by death. Autopsy revealed no anatomical cause of death. Neurovascular shock probably occurred.

In the second case 10 per cent cocaine and adrenal in was applied to the pharynx and tonsils to anesthetize the mucous membrane and 10 c. cm. of a 1 per cent solution of novocaine plus 1/2 c. cm. of a 2 per cent solution of percan were injected for tonsillectomy. The operation was rapidly performed within four minutes. Immediately thereafter the patient collapsed and expired within fifteen minutes with symptoms of respiratory failure. In this case also nothing which explained the death was revealed by post mortem examination.

Review of similar observations in the literature showed nothing new.

(O. STAHL) J. M. SALMON M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Johnson, C R : Pelvimetry by Stereoroentgenometry. *Am J Roentgenol*, 1937, 38 607.

The author employs the cross-thread method of localization first described by Sir J Mackenzie Davidson in 1898 and later recommended by Manges in 1911 for determining the diameters of the pelvis and the fetal head. Stereoscopic films are made of the pelvis with a longitudinal shift of $2\frac{1}{2}$ in. A special marker is attached to the film tray and a metallic object of known length placed on the patient above and to the right of the symphysis. An exposure of 30 ma-sec at 85 kv (peak) is stated by the author to be sufficient for the average case. The amount of irradiation delivered to the skin will be about 10 roentgens.

The films are studied in the stereoscope and the following structures identified: promontory of the sacrum, the sacro-iliac joints at the pelvic brim, the region of the iliopectineal eminence on both sides, the upper margin of the symphysis pubis, tip of the sacrum, inner margins of the tuberosities of the ischi, and the points on the fetal head. After these landmarks are identified the films are superimposed according to the shadows of the special marker on the right side of the films and the exposed spots at either end punched out. The inner margin of the marker shadows is kept in an exact superimposed position and with a needle, holes are punched through both films simultaneously at the points identified in the stereoscope. The films are then placed on the stereoroentgenometer with the holes in the shadows of the special marker over the pegs on the right side of the instrument. In this manner the films are automatically fixed in a position similar to that occupied in the Porter-Bucky tray and in identical relationship to the origin of the cross-wires of the instrument as to the two positions of the tube.

The following diameters are determined: conjugata vera, right and left obliques, bischial, the posterior sagittal diameters of the outlet and the diameters of the fetal head, usually the suboccipitobregmatic and the occipitofrontal. To determine the conjugata vera the tips of the dividers with the wires attached and crossed once are placed on points marked on the sacral promontory and the point at which the wires cross will be the exact location in space with relation to the film of the promontory of the sacrum. This point is established with the adjustable pointer. The upper margin of the symphysis is likewise located and the distance between the two pointers measured with a rule. This will be the conjugata vera. The other diameters are determined in a similar manner.

Since the diameters given in the textbooks are based on measurements of dried pelvises, the author

determined the measurements of 50 patients who had spontaneous deliveries without evidence of cephalopelvic disproportion. The measurements are summarized in Table I.

TABLE I — SUMMARY OF 50 CASES WITH SPONTANEOUS DELIVERY

	Maximum	Minimum	Average
Conjugata vera	15.5 cm.	10.4 cm.	12.1 cm.
Right oblique	15.0 "	12.0 "	13.0 "
Left oblique	15.0 "	11.7 "	13.0 "
Posterior sagittal	10.2 "	5.5 "	7.4 "
Bischial	13.3 "	10.0 "	11.5 "
Sum of P S and B I.	22.2 "	17.1 "	18.9 "
Suboccipitobregmatic	10.0 "	8.5 "	9.2 "
Occipitofrontal	12.0 "	10.0 "	11.0 "

The author examined 453 cases for cephalopelvic disproportion and these are summarized in Tables II and III.

TABLE II — SUMMARY OF 453 CASES EXAMINED FOR CEPHALOPELVIC DISPROPORTION

	Group I	Group II	Group III	Total
Normal	178	89	40	307
Abnormal	98	31	17	146
Total	276	120	57	453
Percentage abnormal	35	31	31	32

TABLE III — ABNORMALITIES OF THE PELVIS

	Group I	Group II	Group III	Total
Flat	12	1		13
Scoliotic		1		1
Kyphotic	2	1		3
Chondrodystrophic	1			1
Spondylolisthetic	1			1
Congenital dislocation of hip	3			3
Generally contracted	14	3	5	22
Funnel	31	12	8	43
High assimilation	7	8	2	17
Fused coccyx	1	1	1	3
Naegele	3	1	1	5
Coalgia	2			2
Poliomyelitis	1			1
Wide symphysis	3			3
Fracture	9	2		11
Spina bifida	1			1
Osteoma	1			1
Short transverse	6	1		7
Total	98	31	17	146

Group I consisted of 276 cases which were seen at the City Maternity Service of Los Angeles City and the Obstetrical Service of the Los Angeles County Hospital, group II consisted of 120 cases from the private practice of experienced obstetricians in Los Angeles, and group III consisted of 57 cases from the physicians in general practice in the vicinity of

Whittier, California. It is interesting to note the uniformity of abnormalities in the 3 groups and that only 32 per cent of all cases suspected of having a cephalopelvic disproportion had an abnormality and many of these had no true cephalopelvic disproportion.

Abnormalities of the fetus consisted largely of abnormalities of position and presentation. Among the 36 abnormalities found there were 3 with large heads, 3 hydrocephalus, 25 breech presentations, 1 face presentation, 4 transverse presentations and 1 shoulder presentation.

Pelvimetry is not complete without an adequate measurement of the fetal head. The problem is one of deciding whether the passage is adequate for the infant. All these findings can be determined if the examination is conducted within the last two weeks of pregnancy. Table IV provides a comparison of the diameters of the fetal head as determined both before and after delivery by section.

TABLE IV.—COMPARISON OF SIZE OF FETAL HEAD AS CALCULATED AND DIAMETERS AS CHECKED FOLLOWING DELIVERY BY SECTION

No.	Diameters Calculated			Diameters Measured		
	Date	SB	OF	Date	SB	OF
1	12-4-39	10.2	11.8	12-6-39	10.7	12.0
	11-24-33	10	11.1	11-26-33	10.3	11.7
2	4-6-35	9.1	11.3	4-16-35	9.2	11.5
4	5-30-33	9.3	11.3	5-31-33	9.5	11.7
5	5-6-34	9.1	11.2	4-6-34	9.3	11.6
6	3-10-35	9.8	1.3	4-3-35	9.8	1.0
7	7-12-36	8.8	9.8	8-7-36	10.0	11.0
8a	6-14-3	9.0	1.3			
8b	7-2-3	9.5	1.3	7-3-3	10.0	11.5

The author has included several excellent reproductions of pelvic and fetal abnormalities as well as the stereoroentgenometer in his article. It should be read in its entirety by those interested in this particular subject.

CARL E. BARTH, M.D.

Desjardins, A. U. The Action of Roentgen Rays on Radium on Inflammatory Processes. *Radiology* 1937, 29, 436.

Many varieties of acute inflammation yield rapidly to a small dose of roentgen rays. A significant fact is that the more acute the inflammation, the smaller the dose of rays required. With such small doses there can be no question of cutaneous or systemic reaction; therefore weak and febrile patients can be treated without danger. In most cases a single exposure is sufficient, but occasionally it may be advisable to repeat the treatment a few days later.

Among the acute inflammatory conditions in which the therapeutic value of irradiation has been

established are furuncle, carbuncle, abscess, cellulitis and phlegmon, onychia and paronychia, acute adenitis and erysipelas. Other forms of acute inflammation such as otitis and mastoiditis, pelvic infection, osteomyelitis and gas bacillus infection also appear to be influenced favorably, but in connection with some of them the evidence is not yet absolutely conclusive.

In 1905 and 1906 Musser and Edsall and Edsall and Pemberton were the first to observe and to report the strikingly favorable influence of a small dose of roentgen rays in 4 cases of delayed resolution of lobar pneumonia. Every other therapeutic measure having failed to improve the pulmonary condition of the patients, roentgen irradiation was tried as a last resort. Within twenty-four hours after exposure, resolution of the pneumonic exudate set in, proceeded rapidly, and the patients recovered.

The first record of the favorable effect of irradiation on parotitis appears to have been made by Heidenhain, who found that the inflammation it acted much as do other acute inflammatory processes. Rankin and Palmer found that a moderate dose of radium applied soon after the onset of the inflammation caused it to subside in most cases within from twenty-four to forty-eight hours. Roentgen irradiation is just as effective, but in many cases radium is preferable because the treatment can be given without disturbing the patient.

When erysipelas does not complicate diabetes or nephritis, roentgen irradiation is usually followed by prompt abatement of the fever and recession of the lesions. This is true especially when the patients are adults and when the treatment is given early. In children, for some unknown reason, the disease does not respond quite so well. In some cases after an initial period of improvement the inflammation may again become active, and additional treatment may be required to arrest the process.

Favorable results may also be obtained by exposing the affected region to a strong erythema or blistering dose of ultraviolet rays. A possible disadvantage may be that during the period of cutaneous reaction to treatment it may be difficult to know what is disease and what represents reaction. Roentgen irradiation has no such disadvantage; the dose required does not cause reactive inflammation.

From time to time other acute inflammations have been found to yield equally well to roentgen irradiation.

For years it has been known that many forms of chronic inflammation are favorably influenced by roentgen irradiation. Among these may be mentioned numerous varieties of chronic inflammation of the skin in which the therapeutic value of radiotherapy is conceded by experienced dermatologists. Other chronic inflammatory processes which may be mentioned as examples are tuberculous adenitis, peritonitis, keratitis, iritis, actinomycosis and blastomycosis, trachoma in its early stages and active infectious arthritis. The dose of roentgen rays for chronic inflammations must be larger than the dose

used for acute inflammations, and treatment must be repeated at intervals for some time

In tuberculous adenitis the affected region must be irradiated every three or four weeks for from three to twelve months. When calcification is absent, the inflamed nodes gradually recede and may disappear completely, or they may remain as small fibrous granules. Unless abundant, caseous material may be absorbed, or it may be replaced by calcium. The resolution of tuberculous lesions appears to be hastened by supplementing periodic roentgen irradiation with daily exposure of the entire body to graduated doses of sunlight or to ultraviolet rays generated artificially.

Much the same may be said of tuberculous peritonitis. An important consideration is that the entire abdominal cavity should be irradiated as uniformly as possible. Physicians in general and many ophthalmologists are not aware that radiotherapy is an effective method of treating tuberculosis of the cornea or iris. The lesions recede more rapidly after exposure to roentgen rays than similar lesions in other parts of the body.

When actinomycosis affects the face, mouth, or other superficial structures, roentgen or radium irradiation supplemented by the internal use of large doses of iodides and sometimes by simple surgical drainage of an abscess is the most effective therapeutic measure, and a large proportion of patients can be permanently cured therewith.

The evidence furnished by a group of writers indicates that the action of the rays is greatest during the early stages of the granular form of trachoma and least during the late stages, when the granulations have been replaced by connective tissue.

In many cases of chronic infectious arthritis roentgen irradiation relieves pain, reduces swelling, and diminishes the functional disability. It has been found that the best results follow repeated treatment and are obtained in cases in which the inflammation is active.

It seems not unreasonable to assume that irradiation, by destroying some of the infiltrating leucocytes, causes the protective substances in these cells to be liberated and to be made even more readily available for defensive purposes than when they were in the intact cells. This action and the increase

in phagocytosis which follows the disintegration of the cells represent the main effects of exposure to roentgen rays and radium and probably explain the usually favorable action of these agents. All the clinical circumstances indicate that inflammatory lesions respond to irradiation in proportion to the degree of leucocytic infiltration. Other circumstances pointing in the same direction are that radiotherapy is most beneficial during the infiltrative stage and less beneficial during the suppurative stage, and that, although the majority of the lesions yield rapidly to treatment, some respond less rapidly or do not respond at all.

To understand the influence of irradiation on chronic inflammations it is necessary to bear in mind a few essential facts. Depending on their character and on the etiological factors which produce them, such lesions are characterized by varying degrees of leucocytic infiltration, connective tissue proliferation, and caseous or calcareous degeneration. Moreover, the clinical effect of irradiation is slow, and maximal improvement or cure requires repeated treatment at intervals. The varieties of leucocytes which are such important features of inflammatory infiltration are exceptionally sensitive to roentgen rays or radium. Connective-tissue cells, on the contrary, are comparatively resistant to irradiation, they are even less sensitive than the epithelium of the skin. In this respect the difference between lymphocytes or polymorphonuclear leucocytes and connective-tissue cells is tremendous. The greater the degree of leucocytic infiltration in proportion to connective-tissue proliferation, the more marked and the more rapid is the influence of the treatment, and *vice versa*. It is probable that leucocytic infiltration, on the one hand, and connective-tissue proliferation, on the other, act in opposite directions, the former tending to increase the effect of irradiation, and the latter tending to diminish or retard this effect.

When dealing with inflammations, the therapeutic radiologist must think in terms quite different from those that apply to malignant tumors as far as dosage is concerned. Even when treatment must be repeated many times, the dose of the rays should never be sufficient to tax the tolerance of the tissues. Otherwise, the condition of some patients may be worse after treatment than before.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Witts L J The Hemorrhagic States *Brit M J* 1937 2 639

The hemorrhagic states are classed as idiopathic or symptomatic and thrombocytopenic or non thrombocytopenic. As regards hereditary forms the local application of coagulent snake venoms is the only new treatment of which the value has been confirmed. The venom of Russell's viper (1:20,000 solution) or of the Australian tiger snake (1:5,000 solution) has been used chiefly. Loose clot is washed away from the bleeding point and tampons or other appropriate dressings soaked in the venom solution are then applied. By means of these preparations it has been found possible to repair wounds or carry out small operations such as dental extractions. The value of liver estrin, moccasin venom and the Sheffield extract of egg albumin has not been confirmed.

For idiopathic thrombocytopenic purpura splenectomy remains the most successful treatment but the frequency of relapses suggests that the operation is a temporary stimulus to platelet formation and not a scientific cure. Vitamin C is of value only in scurvy, whether overt or latent. Its isolation is of the greatest importance and promises improvement in the technique of investigation. New vitamins, such as the reported permeability Vitamin Flavon, the coagulation Vitamin K and the thrombocyte Vitamin T may prove of value in the treatment of the hemorrhagic states. WALTER H. NADLER M.D.

Schnelder H The Bases for the Testing of Circulatory Agents in Surgery (*Ueber die Grundlagen zur Prüfung von Kreislaufwerkstoffen in der Chirurgie*) *Klin Wchnsch* 1937 2 1169

In the presence of a good circulation anesthesia and operation increase the circulating blood volume. In prolonged operations and early in patients in a poor condition the blood volume falls. In inflammatory conditions specifically urological there is already an increased circulating volume which decreases after operation. Non protein nitrogen retention is accompanied by an increased circulatory volume whereas conditions with severely lowered alkali reserves such as serious liver disturbances, cachexia, or uremia are associated with a greatly diminished circulating volume.

The heart plays an important rôle even in primarily peripheral circulatory disturbances. Circulatory collapse is produced by a momentary disturbance of the blood distribution in the entire vascular system but this does not constitute true surgical shock. The explanation of the latter is as yet uncertain. According to Cannon it is due to a severe constriction of the entire circulation and me-

tabolism. Fischer and Thannhauser believe that a state of shock may be present before a dangerous lowering of the blood pressure occurs. Ordinary circulatory remedies are of no avail. Neither saline nor bicarbonate infusions help. Cannon believes that histamine poisoning may be present but this cannot be proved. Block has disputed the toxic theory, but it has only been shown that histamine is not involved. In surgical shock as after trauma the condition is usually present for several hours before the dangerous collapse suddenly takes place. The circulatory remedies that are effective in collapse fail to work, because metabolic disturbances are already present.

Testing circulatory agents on animals does not give the same results as in sick or healthy men. Ventol causes no elevation of the blood pressure in the animal but in healthy men it raises it to as high as 200 mm Hg (Dietrich Schneider). This was confirmed by the author. The pulse rate and blood pressure are not reliable criteria of a patient's condition since they may remain normal after changes have occurred in the composition of the blood and the circulating volume. The only useful tests are the determinations of the circulating blood volume, the minute and heat volumes and the venous pressure. If we are to combat surgical shock we require as the ideal agent something that will be effective in increasing the blood available from the periphery and the cardiac strength.

(FRANZ) LEO M. ZIMMERMAN M.D.

Di Natale L. and Tabonelli M. Traumatic Lesions and Polypeptidemia (Lesioni traumatiche e polipeptidemia) *Arch Ital di Chir* 1937 47 339

Polypeptides as one factor in the breakdown of proteins may play a rôle in the toxic effects of some traumas. This influence is discussed in a review of some of the literature.

The authors report the blood studies of 46 patients who suffered varied degrees of trauma. The first group of 23 patients included those with simple contusions, and wounds of the skin and subcutaneous tissue, muscle, nerve and tendons. In this group there was a definite elevation of the polypeptid content of the blood above the normal average within a short time after trauma. The maximum values appeared after ten hours and remained quite high for several days.

The second group of 14 patients included those with major or compound fractures. Within the first sixteen hours after the injury the polypeptid values reached the upper limits of the physiological average. After twenty-four hours there was a marked increase and the maximum was reached in three days with a return to normal after about fifteen days.

The third group included 19 patients with compound fractures, wounds with fractures, and lesions of the parenchymatous organs. These responded very much like the second group.

That polypeptidemia may result from trauma is definite. It is not possible, however, to evaluate the relationship between hyperpolypeptidemia, eventual toxic manifestations, leucocytosis, and the temperature curve of these patients. The increase of these substances in the blood results from the breakdown of protein injured by trauma. As these substances are formed they are removed from the circulation by the liver.

A. Louis Rost, M.D.

Heifetz, C. J.: Ingrown Toe Nail. *Am J Surg*, 1937, 38: 298

The author summarizes the history and present status of ingrown toe nail, and presents a routine of treatment which incurs a minimum loss of time to the patient and which in the author's hands has yielded great success. A discussion of the anatomy and physiology of the nail is followed by a presentation of etiological factors. The majority of cases are seen in younger people, and the author believes that it is possible that the rapid increase of the size of the foot and nail occurring in adolescents is not taken care of by a frequent change in the size of the shoes. When one considers that ingrown toe nail is a disease of civilization, that savages and other people who habitually go barefooted rarely develop it, and that the condition will generally clear up if a patient is bed ridden because of a prolonged illness, there is little room for argument on the rôle played by footwear.

The incidence of ingrown toe nail could certainly be reduced by scrupulous prophylactic methods, but as long as shoes are worn many cases will continue to develop. The nail should be allowed to grow to considerable length and then cut straight across, thereby bringing the corners sufficiently distal so that they are unable to press into the soft parts, and if the nail is sufficiently long, the pressure of the shoe on the convex center of the nail will tend to push the corners upward and away from the soft part. However, this would make it easy to perforate the end of the hose, which event would call for wearing slightly oversize hose, and, occasionally, the sharp pointed corner of the nail which might stick into the tissue of the adjacent toe could be remedied by cutting away a tiny portion of the corner of the nail by a small diagonal cut.

The conservative treatment includes separation of the nail from the soft parts by use of cotton packing, treatment of the soft parts, bandaging of the parts in position, and the use of mechanical appliances.

Operative treatment is recommended for patients who present themselves when conservative treatment is no longer possible and during the period of granulations. For from three to five days before operation the patient is instructed to soak and cleanse the foot in a bath of warm water for one

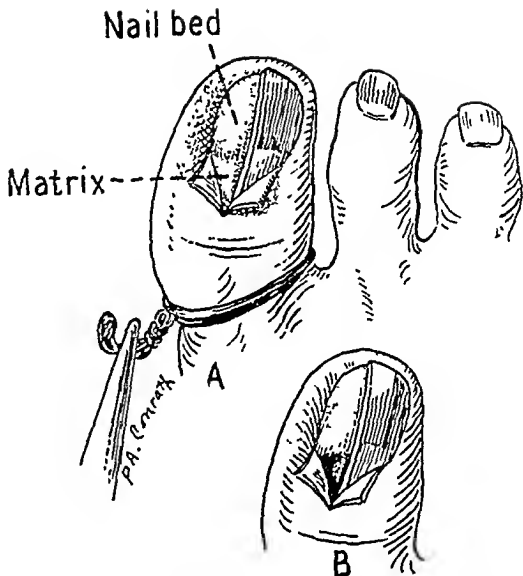


Fig. 1. A. Exposure of the nail-bed and matrix after removing strip of nail. B. The matrix has been curetted away. (Note the illustrations show the removal of too much nail.)

hour twice a day. White socks are preferable and if walking is difficult a cut out shoe should be worn. After iodine preparation of the skin the field is rendered bloodless by the application of several turns of an ordinary elastic rubber band applied to the base of the toe and pulled up snugly with an artery forceps, before the local anesthetic is injected, because it seems to render injection less painful and confines the anesthesia to the region desired. An incision three-eighths inch long is made in the eponychium and the proximal nail wall extending slightly diagonal laterally from a point on the nail corresponding to the line on which the nail will presently be excised. This is made deep enough to strike the root of the nail. Medial and lateral flaps are dissected along this line so as to expose at least the lateral third of the nail root on that side. The lateral flap should also include sufficient tissue so as to expose the imbedded nail. A small thin flat metal spatula is then inserted beneath the free border of the nail between the nail plate and the nail bed along the line where the nail is to be cut and, hugging the under surface of the nail, is pushed proximally until it emerges in the incision proximal to the root of the nail. This spatula is then worked laterally until it lifts the involved portion of the nail from the nail bed. Using a small scissors the freed involved portion of the nail is excised along a straight line, which exposes the nail bed and, proximally, the matrix on that side. About a third of the nail should be removed. It is most important at this time to completely curette away the exposed matrix,

since only a small fragment left behind will give growth to an annoying island of nail. The wound is thoroughly swabbed with a cotton applicator soaked in 95 per cent phenol and then with alcohol. Hypertrophied tissue or granulations need not be removed unless they interfere with proper self closure of the wound.

A F SAVA, M D

Litter J Marble B B and Salter W T. The Relation between Nuclear Division and the Ammonia Metabolism of Growing Tissues. *Am J Cancer* 1937, 31: 263.

An interesting characteristic of surviving malignant tissue is the fact that its production of ammonia can be reduced by the presence of glucose in the surrounding medium. Wachurg has pointed out that this phenomenon is exhibited chiefly by those tissues which show a high anaerobic glycolysis. Salter and Robb showed further that the same carbohydrates which are subject to anaerobic glycolysis by sarcoma also reduce the production of ammonia by the malignant tissue. Using tissue cultures Wachorn and Holmes found that this reduction of ammonia disappeared in resting cultures and reappeared when the tissue was growing actively. The observations suggested that the reduction of ammonia was related to growth. It might be expected therefore that a correlation would be shown between the metabolic activity of various tissues and the extent of mitotic activity displayed by their cells. The authors tested this hypothesis. A series of tissues in varying stages of reproductive activity was studied with regard to the reduction of ammonia by glucose and their respective mitotic activities. These tissues included resting normal liver regenerating liver and embryonic liver in addition to fibroma and sarcoma. The results indicate that the reduction of ammonia tends to vary directly with the percentage of nuclei undergoing mitotic division. It is suggested that it is a biochemical index of nuclear division in the same sense as the anaerobic lactic acid production.

JOSEPH F. NARAT, M D

Fischer A. The Theory of the Developmental Physiology of Malignant Tumors. *Am J Cancer* 1937, 31: 1.

The most striking characteristic of cancer cells is their capacity for unlimited proliferation. The control of proliferative and regenerative processes would seem to be the fundamental problem of growth phenomena. Regeneration and cell multiplication as a physiological consequence of cell injury and cell disintegration may be the expression of a general law

From the author's investigations on the physiology of tumor cells, he has reached the conclusion that their unlimited growth in the organism is also the physiological consequence of cell injury. Whereas the usual regenerative processes such as for instance wound healing and any cancerogenic processes are due to extrinsic factors, the unlimited growth of cancer cells is of an intrinsic nature. The malignant tumor cell may be characterized as a diseased and short lived cell. Even when dead normal cells and cancer cells behave in different ways. Whereas the normal cell remains for a long time among the living cells in a rather inert state, the body of the dead cancer cell is readily hydrolyzed and soon disappears, liberating active proteolytic enzymes. No wonder that colonies of such cells are in a state of continual proliferation.

On the basis of his own experimental observations and those of other investigators, the following theory of the pathogenesis of cancer was formed by the author. Malignant tumor cells are a variety of the normal average tissue cell and as such are present in the tissues and organs of every individual. These cells have unlimited ability to grow and multiply within the most dissimilar parts of the organism but because they are probably very few in number they do not generally proliferate and form tumors. By autologous grafting of healthy normal tissue it was possible to induce competition among the cell types in the graft whereby those most fitted to adapt themselves to the foreign site in the organism would survive and multiply. In this way it was possible to produce through natural selection a cell race which finally multiplied at the expense of other cells and formed genuine malignant tumors which cells supported the theory that the cancer cell is an ubiquitous variety of normal tissue cell.

The application of this theory to various phases of the cancer problem is discussed. The theory in no way conflicts with what is known about cancer, rather it explains many hitherto obscure facts. The cancer cell is already present and needs only what may be termed a realization factor in order to develop into a malignant tumor. Old age, chronic proliferative activity, infectious disease and viruses are such factors. Proliferation of tissue cells creates an environment which is favorable for the multiplication of the single cells with malignant properties. When the number of cancer cells has reached a certain minimum they may continue their automatic independent growth. The cancerogenic compounds as well as certain hormones create favorable conditions for the growth of scattered single cancer cells.

JOSEPH F. NARAT, M D

INTERNATIONAL ABSTRACT OF SURGERY

JUNE, 1938

PRINCIPLES OF SURGICAL PRACTICE CHOICE OF ANESTHESIA

L. F. SISE, M.D., Boston, Massachusetts

THE main factors to be considered in making a choice of anesthesia are its safety and efficiency and its comfort for the patient. Safety is naturally the most important consideration and overshadows all other considerations. However, that anesthesia which is safest when considered alone and by itself may, if it does not facilitate the work of the surgeon, be more dangerous, when the whole procedure is considered, than some other more efficient anesthesia. After all, the final objective of any operation is the relief of a surgical condition, and any anesthesia which does not efficiently contribute to this is probably less desirable than one which promotes surgery and makes it safer. Thus, the efficiency of the anesthesia may come to be a large factor of its safety. This is true particularly in the abdominal region. Comfort of the patient is, of course, always desirable and should be promoted whenever possible, but if it interferes with the safety of the anesthesia or the full and safe accomplishment of the surgical procedure, it should be subordinated to these two.

In general, the safest anesthesia is that which interferes least with the normal physiological processes of the body and produces the least harmful effect on the vital organs. The safety of any anesthesia may, however, vary decidedly according to a good many factors, so that, while it may be the safest choice in one case, it might be quite far from safe in another case.

On the whole, the anesthetics which are least harmful in themselves are the local acting anesthetic drugs, which are used in local, regional, epidural, and spinal anesthesia. They do, however, produce some harmful effects. These effects are of two types which should be clearly distinguished:

1. In local and regional anesthesia there are systemic effects which are due to absorption of toxic amounts of the drug into the circulation.

2. In spinal anesthesia, while there is still disagreement as to the exact mode of the production of these effects, the weight of opinion leans to the view that absorption into the circulation is not usually an important consideration. Thus, drugs showing the least toxicity on absorption into the body should be used for regional anesthesia, while some having a more toxic action are allowable for spinal anesthesia.

The safest drugs for regional anesthesia are, therefore, novocaine and metycaine, the latter being somewhat more efficient and longer acting, though also slightly more toxic. Pontocaine and nupercaine are more toxic and, therefore, less safe for this purpose. Nupercaine in particular has a toxic action on the heart which is quite dangerous.

In spinal anesthesia the situation is very different. Here absorption of toxic amounts is not an important factor, probably because the total dose is so small, and drugs may, therefore, be used which are too toxic for use in regional anesthesia. The use of pontocaine and nupercaine is therefore allowable and, moreover, has certain important advantages for spinal anesthesia. These anesthetics appear to have a less pronounced effect on the vasomotor system than novocaine and metycaine and, clinically, produce less vascular depression than the latter drugs, especially in relation to the length of anesthesia. Moreover, the much more prolonged anesthesia which they produce is of separate and distinct advantage in itself.

Thus it appears to us that novocaine and metycaine are preferable for local and regional anesthesia, and pontocaine and nupercaine are preferable for spinal anesthesia.

From the Department of Anesthesia, Lahey Clinic, Boston

Local and regional anesthetics, while inherently safe, have a number of disadvantages in their practical application, sometimes their safety is considerably decreased. Occasional cases of idiosyncrasy are encountered in which the patient shows such extreme sensitivity to the toxic action of the local acting drugs that death may result from the anesthesia alone. The anesthesia may be so inefficient that the surgeon is hampered and restricted in his work and his attention is distracted by discomfort of the patient. The patient may be uncomfortable, nervous and restless during both induction and operation.

Epidural anesthesia is in reality a form of regional anesthesia and is called epidural anesthesia simply because of the location in which this regional anesthesia is applied. The dose of the drug is comparatively large and there is, therefore, an important amount of absorption into the general circulation. A toxic drug such as pontocaine or nupercaine is therefore not desirable as the sole anesthetic agent. While we have used this method in but a few cases and therefore cannot speak from personal experience, it appears to us less desirable than spinal anesthesia. The induction period is very much longer, the dose of the anesthetic drug is far larger and it is not invariably effective.

Spinal anesthesia might also be called a form of regional anesthesia since it produces its effect by blocking the conductivity of the nerves. The drugs act however on the nerve fibers at a point where they are devoid of any sheath, and therefore, as they do not have to penetrate the sheath they have a much more rapid and potent effect. When compared with the various forms of regional anesthesia the dose required is extremely small. It is, therefore, a very valuable form of anesthesia because of its high efficiency and lack of disturbance to normal physiological processes or of harmful effects on vital organs. Extensive anesthesia may be produced by means of but a single puncture and a comparatively small amount of the drug. It is rapid, certain and effective and postoperative recovery is excellent. Thus it is often the preferred choice of anesthesia in situations in which it is applicable.

It has, however, been the subject of much controversy and has been criticized severely by some on the score of its danger and of its limited and sometimes too short period of action.

The first objection has been greatly lessened by the recent advent of the drugs pontocaine and nupercaine and by many improvements in technique and management. Moreover the danger varies so much under different circumstances such as the competence of the anesthetist the

height and duration of the anesthesia and the condition of the patient that no unqualified assertions are justified.

The second objection has been greatly lessened by the advent of these two drugs which will produce anesthesia, if necessary, up to approximately three hours.

The necessity for a well qualified anesthetist should be particularly stressed as this is a form of anesthesia in which this is of more importance probably than in any other. Not only should the anesthesia be administered correctly, but it should be overseen carefully and competently during its entire course. Treatment of untoward conditions as they arise is extremely effective and its omission or improper performance certainly converts this anesthesia into a most dangerous procedure.

With this proviso that it is administered and watched by an anesthetist competent in this particular field, it may be said that low spinal anesthesia, namely, below the level of the abdomen is eminently safe and can be made to outlast an operation of any conceivable length.

When the height of anesthesia begins to encroach on the abdomen, depressive effects become more evident but are still slight if only the suprapubic region is included. The most marked effects occur when the whole abdomen is anesthetized but even then they are not so great as to prevent its employment in any but the most enfeebled patient, especially if the operation is short and the amount of the drug therefore small. Here the increase in safety of the operation often overbalances the increase in danger of the anesthesia when the latter is considered alone.

GENERAL ANESTHETICS

The general anesthetics may be divided into inhalation anesthetics and non inhalation anesthetics.

Inhalation anesthetics. There is considerable variation in toxicity and efficiency between the members of this group. Their arrangement roughly in ascending order of their toxicity is as follows:

- Nitrous oxide
- Ethylene
- Ether¹
- Cyclopropane¹
- Vinyl ether
- Ethyl chloride
- Trichlorethylene
- Chloroform

While the order of this arrangement is fairly evident in a general way there is much room for

¹ Ether is followed by more after-effect but cyclopropane is more dangerous during administration and has its effects more prolonged.

dispute in the actual details. For instance, nitrous oxide while apparently least toxic in itself, is often accompanied by so much anoxemia that in its clinical application it is apt to be more toxic than ethylene unless it is used with some other anesthetic to decrease the anoxemia. Occasional deaths have taken place on the table from the anoxemia of pure nitrous oxide-oxygen, and serious cerebral damage has been caused.¹ Nitrous oxide is one of the anesthetics the danger of which varies very greatly with the competence and experience of the anesthetist. Ethylene, according to laboratory investigation and its clinical application in many hundreds of thousands of cases, has proved to be one of the safest drugs at our disposal, but its use is accompanied by a mild degree of anoxemia, though less than that with nitrous oxide, and it has received much undeserved notoriety because of explosions which have taken place, some of them fatal to the patient. None of these, however, as far as I am aware, has occurred with ordinary anesthetic mixtures of the drug. Many more explosions have taken place with nitrous-oxide ether than have occurred with ethylene or cyclopropane. While this may be due to the more frequent use of nitrous oxide, it shows the explosibility of this mixture and the necessity for as great care when using it as when using ethylene.

The toxic effects of these drugs may vary according to the characteristics of the patient. For instance, cyclopropane has a distinct, toxic action on the heart, while vinyl ether has some toxic effect on the liver. The toxicity of one of these for a given patient would, therefore, vary according as he had a damaged heart or a damaged liver. The exact action of trichlorethylene has not been definitely determined, but the close relation of its chemical structure to that of chloroform suggests a strong possibility of some toxic action on the liver and vascular system.

The toxic action of all these drugs is very much greater in a deep plane of anesthesia than in a light one. I have noticed this difference particularly with ordinary ether and with cyclopropane. Here the difference is so marked that when the same anesthetic is employed at different depths it seems as if different anesthetics were being used. A truly light plane of ether anesthesia even of considerable length, from two to three hours, causes surprisingly little disturbance either during or after anesthesia, while a deep plane, as frequently employed, increases the susceptibility of the patient to shock, and is followed by depression,

nausea and vomiting, upset of the acid-base balance, interference with the metabolism of sugar, and lowering of the function of the liver and kidneys. Similarly with cyclopropane, a truly light plane of anesthesia has almost no disturbing effect on the patient either during or following anesthesia, except occasionally a tendency to nausea and vomiting, while a deep plane tends to cause irregularity of the pulse with extra systoles during anesthesia, and is followed by depression, nausea and vomiting, and often a sharp drop in blood pressure. It does not, however, show a toxic effect on the liver or kidneys. These two drugs are, therefore, excellent for use in a light plane of anesthesia or in combination with other anesthetics, but are not so well suited for use in a deep plane.

The drugs near the end of the list, vinyl ether, ethyl chloride, and trichlorethylene are all so toxic that it is best to limit their use quite strictly. With vinyl ether the anesthesia should be either very light or rather short (less than three-quarters of an hour), preferably both. Within these limits it is very useful for such short procedures as induction of ordinary ether, paracentesis, removal of packs, and so forth. Since it is quite portable it may be preferable to the gases when this quality is important. Ethyl chloride affects the vascular system and is, therefore, less safe than vinyl ether. Trichlorethylene is little known and untried, its sole claim to attention being that it is non-inflammable and therefore may be of use in a few cases in which an uncontrollable source of ignition, such as x-rays, is close at hand. Chloroform is so dangerous to the heart during anesthesia and to the liver after anesthesia that it had best be avoided entirely.

Non-inhalation anesthetics. This group includes various drugs which may be used as rectal anesthetics, such as avertin, some of the barbiturates and paraldehyde, and various ones which may be used as intravenous anesthetics such as sodium n-methyl cyclohexenyl methyl malonyl urea (evipal), sodium ethyl 1-methyl butyl thiobarbiturate (pentothal), and paraldehyde. Their chief advantage is that they are entirely non-inflammable and so are perfectly safe as far as danger of fire or explosion is concerned even under such unfavorable conditions as accompany the use of surgical diathermy or x-rays. They have the additional advantage that they are followed by comparatively little postoperative upset, especially nausea and vomiting.

As a group they are not so directly under the control of the anesthetist as are most of the inhalation anesthetics. This is true particularly when they are used rectally. Consequently, in rectal

¹Courville, C. B. Asphyxia as a consequence of nitrous-oxide anesthesia. *Medicine*, 1916, 15: 229-242.
²Lewenberg, A., and Zbinden, T. Destruction of the cerebral cortex following nitrous oxide anesthesia. *Anest. & Anal.*, 1938, 17: 101-108.

anesthesia the dose should not be large enough for complete anesthesia, except in a very few instances when only an extremely light plane suffices. Almost invariably it is best to use them only for pre operative medication or for basal anesthesia. An inhalation anesthesia used in addition provides the necessary control. Used in this way in sufficiently small doses they are safe, they allay nervousness, and decrease the amount of inhalation anesthesia necessary and thus decrease postoperative upset. In particular they allow the use of nitrous oxide without the necessity of any or more than slight anemia.

The intravenous anesthetics though less controllable than most of the inhalation anesthetics, are considerably more controllable than the rectal anesthetics. With rectal anesthetics when the enema has once been given absorption continues for some time even though no more of the anesthetic is given. With intravenous anesthetics on the other hand absorption stops and since most of these drugs are broken down quite rapidly, anesthesia begins to recede as soon as administration is stopped. Indeed with evipal and pentothal the rapidity of control appears to approximate that with ether. There is, however, one qualification to add to this. It is possible that if a patient goes into shock, lightening of the anesthesia may be considerably delayed. The use therefore for complete anesthesia in cases in which shock may supervene is debatable.

REGION OF THE BODY

The appropriateness of any given form of anesthesia is modified decidedly by the region of the body to be operated upon, whether it be the trunk and extremities, exclusive of the abdomen, the head and neck, or the abdomen.

Trunk and extremities exclusive of the abdomen. These are usually the easiest regions with which to deal since deep anesthesia is seldom needed and there is little or no interference between the surgeon and anesthetist. There is therefore a wide choice of anesthesia almost any of the general or local acting anesthetics being on occasion reasonably acceptable. Local and regional anesthesia are excellent when they are readily applicable. However if the patient is nervous or apprehensive especially when multiple punctures are necessary during induction, a general anesthetic may be preferable. Local infiltration or field block is well suited for the removal of small tumors or even for simple mastectomy. Brachial plexus block is effective for the arm, forearm, and hand except portions of the upper arm and induction is not too

uncomfortable for the patient. Caudal anesthesia is usually effective for cystoscopy, and the one puncture necessary is not too uncomfortable. It is not sufficient, however, for cystoscopy in painful bladder conditions and is uncertain for anal operations. Trans-sacral anesthesia is effective for operations on the external genitalia for anal operations and for cystoscopy in many painful bladder conditions. It is not entirely satisfactory for transurethral prostatic resection. However it requires multiple punctures which are often quite distressing to the patient, there is often evidence of toxic absorption, and like caudal anesthesia, it is not without danger unless expertly given.

For these various reasons therefore we usually prefer low spinal anesthesia. This requires but one injection and is therefore acceptable to the patient. It is rapid and certain and requires but a tenth or less of the dosage necessary for trans-sacral anesthesia. It has the disadvantage however, that the patient must usually lie flat in bed for at least twenty-four hours after puncture in order to avoid postpuncture headache.

Almost any one of the general anesthetics may be used for the trunk and extremities especially if with the more potent ones but a light plane of anesthesia is used. I would like to emphasize once more, and strongly, the difference in postoperative upset between deep anesthesia and light anesthesia.

Combinations of anesthetics are very satisfactory for the trunk and extremities as in many other parts of the body. Nitrous-oxide ether is commonly used. We prefer nitrous-oxide cyclopropane unless a deep plane of anesthesia is necessary. With 50 per cent nitrous oxide as the basis to per cent to as low as 2 per cent cyclopropane gives very satisfactory results.

If diathermy or x-ray is to be used one of the non inflammable anesthetics such as a rectal anesthetic combined with nitrous oxide or an intravenous or local acting anesthetic should always be used. Here intravenous anesthesia is very useful.

Occasionally deep, muscle relaxing anesthesia is necessary. When but a short period is needed, as in manipulations of the shoulder or back intravenous pentothal is most excellent. Induction is very rapid muscular relaxation is excellent and postoperative upset is slight. The same anesthesia may also be used for procedures of several hours but if muscular relaxation is needed over this period spinal anesthesia is preferable in the lower extremities and one of the combinations of anesthetics elsewhere, as it is questionable whether

such deep anesthesia with pentothal should be maintained over a long period. Intravenous anesthesia with pentothal or evipal may, however, be carried on for several hours if but a light plane of anesthesia is sufficient. For procedures on the lower extremities when muscular relaxation is needed, as in tendon transplantation and operations on the femur and hip joint, spinal anesthesia is excellent. Prolonged anesthesia is easy to obtain at such low levels, the effect on blood pressure is minimal, muscular relaxation is extreme, and postoperative upset, even after several hours of operating, is comparatively slight.

Head and neck. Here, also, but a light plane of anesthesia usually suffices, but the fields of the surgeon and the anesthetist are so close together that the use of the ordinary surgical mask is often impossible. Local and regional anesthesia are, therefore, frequently of value. Field block is simple and effective for operations on the scalp, cranial vault, and brain. Work on bone, however, is unpleasant to the patient, and in brain surgery the prolonged maintenance of one position with other discomforts, frequently makes a general anesthetic advisable.

In all these operations about the head under general anesthesia, intravenous as well as inhalation, it must be remembered that provision must be made for maintenance of unobstructed breathing during operation.

For brain surgery, ether vapor with an intratracheal catheter is quite satisfactory and adequate airway is assured. The flow of anesthetic is accurate, a comparatively light plane of anesthesia suffices, and postoperative recovery is good. Preliminary avertin is probably of advantage, if the patient is not a poor risk, in lessening the amount of ether necessary, in decreasing intracranial pressure, and in decreasing the patient's apprehension beforehand.

Virtually all nose and throat operations may be done to advantage under local and regional anesthesia if sufficient preliminary narcosis is obtained. Here the retention of the cough reflex is of value. In the young and apprehensive, ether vapor by pharyngeal insufflation is simple and effective, or one of the gases may be used by the intratracheal route with carbon-dioxide absorption. The intratracheal catheter, preferably with a cuff, should always be used if there is danger of inhalation of blood or detritus.

In operations on the anterior aspect of the neck, cervical plexus block is effective and is valuable in operations like esophageal diverticulum when the patient's cooperation may be helpful. The procedure of induction, however, is somewhat uncom-

fortable for the patient and time-consuming, and as the surgical mask is not ordinarily in the way, for most operations in this region one of the gases is usually most practical. If the surgical mask may be in the way, as in some operations for thyroglossal cysts, intratracheal anesthesia with one of the gases, or possibly pharyngeal insufflation with ether vapor should be used. In thyroid operations when there appears any possibility that there may be obstruction to breathing from pressure on the trachea or paralysis of a vocal cord, an intratracheal tube should be used, simply as an airway, and the surgical mask may be placed over it. Inhalation anesthesia with one of the gases in a closed system is of considerable value if obstruction to breathing unexpectedly develops in the course of one of these operations. A high concentration of oxygen may then be used, pressure may be employed, and, if necessary, intratracheal anesthesia may be quickly instituted.

Abdomen. With operations in the abdomen, conditions are entirely different from those in the two regions just discussed. Deep muscular relaxation is almost an essential for safe and effective surgery, and quiet breathing is very desirable, especially for operations in the upper part of the abdomen.

Local and regional anesthesia fulfill these conditions nicely, but it is practically impossible to make the field of anesthesia sufficiently large to permit of free operation and exploration. Nitrous oxide anesthesia used alone is entirely inadequate; ethylene is only slightly better, and cyclopropane, while much better, also fails to provide the best operating conditions, and is too toxic for such depth and such length as are usually required. Ether is the sole inhalation anesthetic which alone approaches adequacy. However, unless extreme depth is maintained, relaxation is not complete, and breathing is stimulated. If sufficient depth for really satisfactory conditions is maintained, especially for a considerable period, the toxic qualities of the drug are greatly enhanced.

There are a number of combinations of anesthetics which are fairly satisfactory. One which we have employed many times with considerable satisfaction consists of preliminary avertin, nitrous oxide or cyclopropane with ether by the intratracheal method, with carbon-dioxide absorption, and abdominal field block. The sum of the effect of these various agents produces sufficient effect without the necessity of any one drug's being pushed to the point of producing any marked toxicity of its own. Field block produces local relaxation without the necessity of deep general anesthesia. The intratracheal tube and carbon-

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dioxide absorption promote easy, quiet breathing without straining

No other method of anesthesia, however produces such satisfactory operating conditions as spinal anesthesia. Muscular relaxation is complete, breathing is quiet, and in addition the incisions are contracted, a factor which may be of considerable advantage and which is not produced by any general anesthetic. Moreover, it has the advantages of the local acting anesthetic drugs in that postoperative upset is minimal. The newer drugs and methods, pontocaine and nupercaine with careful dosage, intravenous infusion with ephedrine, oxygen inhalation and other procedures of value have practically abolished the old fear of collapse or too short anesthesia. Spinal anesthesia is invaluable in abdominal surgery and unquestionably, when properly employed, saves lives and enables better surgical results to be obtained. Its value, however is somewhat decreased by the fact that, probably more than any other anesthesia it requires the services of an anesthetist well trained and experienced in this particular field.

Epidural anesthesia is in many ways similar to spinal anesthesia but, as stated above, appears to us to be inferior to it.

CONDITION OF THE PATIENT

The condition of the patient frequently has a decided influence on the choice of anesthesia but these influences have already been to a large extent mentioned in discussing the various anesthetics.

With patients whose general condition is poor the most toxic and depressing anesthetics should be avoided. The local anesthetic drugs should be employed when the resulting anesthesia is effective for the proposed operation. Therefore, low spinal anesthesia is excellent and may be used with patients in very feeble condition even for levels as high as for suprapubic operations. A high spinal anesthesia, however, is usually too depressing for very feeble patients and in abdominal surgery should give place to a well chosen combination of anesthetics given by the intratracheal method with carbon-dioxide absorption. When the operation is to be of quite limited extent as for gastrostomy, enterostomy or cholecystostomy, abdominal field block is most excellent for these patients. In other regions a very light plane of anesthesia, with one of the simple combinations usually suffices.

Heart disease. Valvular heart disease influences very little our choice of anesthesia if the defect is

well compensated, and even with some degree of failure has surprisingly little effect. With well marked failure, however, and especially with myocardial damage danger is greatly increased. Here the local acting drugs are indicated when efficient, if the patient is of equable or stolid temperament, but if he is nervous or excitable a general anesthetic is preferable. A light plane of anesthesia is quite acceptable either with ether, cyclopropane or a combination of anesthetics or with intravenous anesthesia. Marked changes of blood pressure should be avoided, especially with coronary disease. Deep cyclopropane and to a less extent, deep ether anesthesia should be avoided. Patients with angina pectoris practically always do well under a light general anesthesia, but may succumb to an attack as activity is resumed during convalescence.

With liver disease the most toxic drugs, such as vinyl ether, trichlorethylene, and chloroform, should be entirely avoided and ether should be used in but a light plane. Cyclopropane and local acting drugs are preferable. Those drugs also which are detoxified in the liver such as avertin and the barbiturates should be avoided.

With kidney disease the indications are much the same. The preliminary use of morphine has some protective influence against toxic effects at least those of ether.

Lung disease does not appear to be specifically affected to a marked degree by the anesthetic employed, but rather by more general influences such as the site and length of operation, the presence of infection, chilling of the body, and other depressing influences. The choice of anesthesia should, therefore be similar to that for any patient in poor condition with an avoidance of anoxemia and of toxic anesthetics in a deep plane of anesthesia.

SUMMARY

The various anesthetics have been discussed from the standpoint of their safety and efficiency and some of their more suitable uses have been suggested. Regional anesthesia is usually safe but often ineffective. Spinal anesthesia presents a unique combination of high efficiency and low general toxicity but is dangerous unless competently applied. The more toxic inhalation anesthetics should be used in a light plane and the most toxic used briefly or not at all. Combinations of anesthetics are extremely useful. The non volatile general anesthetics are useful chiefly because they are non inflammable but are useful also in combinations.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Spaeth, E. B.: Ptosid and Its Surgical Correction. *J. Am. M. Ass.*, 1937, 109 1889

Blepharoptosis is the inability to raise the upper lid owing to paralysis or paresis of the musculus levator palpebrae superioris. It may be congenital, may follow trauma, may be a part of the residual condition of inflammation of the orbit, or may be a part of a complete or incomplete external ophthalmoplegia, either central or peripheral in origin. Surgical ptosis should be considered as any one of these conditions when it is stationary, cannot be corrected by any medical treatment, and impairs vision. A correct diagnosis as to the character of the ptosis and an exact estimate of its degree are prerequisites to a satisfactory outcome.

The basis of all surgery for ptosis exists in the utilization of the levator palpebrae superioris, the occipitofrontalis with the corrugator supercilii, and the superior rectus, either individually or together. Four general procedures are available: shortening of the eyelid itself, advancement or advancement with resection of the levator, replacement of the levator by the occipitofrontalis, and the utilization of the superior rectus. The selection of the operation to be used in an individual case is perhaps the most important factor in ptosis surgery. The utilization of one or more procedures in a single case is not at all uncommon, especially when complicated forms of ptosis are to be corrected.

The author describes and discusses the various techniques

SAMUEL KAHN, M D

Dvorak-Theobald, G.: The Neurogenic Origin of Choroidal Sarcoma. *Arch. Ophth.*, 1937, 18 971

The main object of this article is to show that the neoplasm of the choroid which has hitherto been described in the literature as choroidal sarcoma is much more probably a neurogenetic tumor, arising from the Schwann-sheath cells of the posterior ciliary nerves traversing the choroid. The neural origin of so-called sarcoma of the choroid is supported by the histological observations in 7 cases which the author has studied.

Before presenting and discussing his histological studies, the author briefly summarizes the literature dealing with neurogenetic tumors in general, and describes the structure of choroidal, neural, and other neoplasms, including those termed sarcoma, that are found in this vascular membrane.

The nature of neurogenetic neoplasms in general is discussed, with particular reference to Masson's histological investigations regarding cutaneous nevi and tumors of the peripheral nerves. The literature

regarding melanotic neoplasms and the origin of pigment is reviewed.

The author suggests a revised classification of neoplasms which would distinguish ectodermal neural tumors from those of a different embryonal origin.

LESLIE L. McCoy, M D.

Gradle, H. S.: X-ray Therapy of Retinal-Vein Thrombosis. *Am. J. Ophth.*, 1937, 20 1125

The mechanism of the production of retinal-vein thrombosis appears to be as follows.

1 Under the influence of some general condition, there is produced a narrowing of the lumen of the retinal arteries that results in a marked decrease in the rapidity of the blood stream.

2 As the result of a generalized toxemia or sclerosis, an endophlebitis or mesophlebitis appears in a vein. This inflammation produces a roughened nodule, probably made up primarily of endothelial cells, which protrudes into the lumen of the vein.

3 From the blood stream, which has been slowed up primarily in the arteries and secondarily in many cases by the sharp retrobulbar bend of the vein, fibrin together with red and white blood cells is caught by the nodule within the lumen of the vein. From these deposits, the nodule increases in size in three dimensions until the lumen of the vein is nearly or entirely closed.

4 After the circulation of the blood in the vein has decreased nearly to the vanishing point, the ophthalmoscopically visible manifestations appear in the retina.

After the vein has been more or less completely occluded, the retinal phenomena appear in probably the following order: retinal edema, loss of vision, retinal hemorrhages, exudative areas.

The retinal hemorrhages vary in extent according to the caliber of the thrombosed vein and the extent of the retinal area drained by the vein. In all probability, the hemorrhages are from the capillaries and not from a rupture of the vein itself.

It is certain that in some cases, probably the late ones, there has been a growth of heavily vascularized new tissue over the surface of the iris which, in turn, leads to a complete blockage of the chamber angle. These are undoubtedly the cases of severe "hemorrhagic glaucoma." In other cases, the angle occlusion results only from an albuminous coagulum.

In view of the known danger of eventual malignant hypertension, it has been the policy of many ophthalmologists to insist upon the daily and continued use of pilocarpine in the affected eye for at least several years or until the danger seems lessened. The continued use of a miotic as a preventive is a wise precaution.

'From these few statistics it would not appear that irradiation is entirely successful in preventing secondary glaucoma subsequent to retinal vein thrombosis. But I have a very definite impression that this therapy is of value in that respect and I intend to continue its use probably somewhat more intensively in the future. But from the standpoint of rapidity of absorption of retinal hemorrhages no difference could be noted between the eyes that were irradiated and those that were not. From the standpoint of final vision it is evident that x ray therapy is of no material benefit. But from the study of this and similar series of cases, it can be seen that a fairly high percentage of cases of hypertension secondary to retinal vein thrombosis occurs in preglaucomatous eyes in which hypertension would eventually develop even without the ocular insult. The latter precipitates an acute attack. The prevention of hypertension in the eyes that are not of preglaucomatous type can be aided either by the continued local use of a miotic or by radiation therapy in a high percentage of cases. LESTER L. MCCOY M.D.

Stallard H. B. A Case of Intra Ocular Neuroma (von Recklinghausen's Disease) of the Left Optic Nerve Head. *Brit J Ophthalm* 1938 22 21

Von Recklinghausen's disease is congenital, slowly progressive, and affects males more commonly than females. Ocular complications are evident in some cases of this disease. The characteristic pathological changes are confined to and diffused throughout the distribution of one or more contiguous nerves or a nerve plexus. Branches of the first division of the fifth cranial nerve, the optic nerve, and nerves to extra ocular muscles are sometimes affected.

A case of neuroma affecting the optic nerve head of the left eye in a young man nineteen years of age

is reported. His history showed that in two preceding generations of the family there had been cases of multiple neurofibromas affecting the central nervous system and the nerves serving the special senses of sight and hearing. The histopathology of the neoplasm affecting the optic nerve head is described and microphotographs illustrating these changes are shown. Three years after the disease had been discovered in his left eye the patient developed signs of raised intracranial pressure from a neoplasm or possibly several neoplasms inside the skull. The right auditory nerve was involved. A subtentorial decompression was followed by death two days later. LESTER L. MCCOY M.D.

Goldstein I. and Wexler D. Bilateral Atrophy of the Optic Nerve in Periarthritis Nodosa. A Microscopic Study. *Arch Ophthalm* 1937 15 67

The authors have given a detailed historical account of bilateral atrophy of the optic nerve in periarthritis nodosa, an unusual condition and have illustrated their article with photomicrographs and a very detailed case report. Then they summarize as follows:

'The lesions in this case correspond to those described in a great majority of the cases of this condition reported. Apparently the arteries of the ciliary system are most vulnerable. In almost every instance the choroidal vessels are affected and in some the short posterior ciliary arteries as well. In cases in which the retinal artery has been found to be diseased such change is limited in the portion behind the lamina cribrosa and not in the retinal arterioles. That the changes are restricted to the vessels conforms with the general rule that periarthritis nodosa attacks only vessels of medium size or those with well defined muscular coats. Von Hertzen and expressed an interesting opinion regarding the site of predilection of the lesion. It appeared in his case that the periarthritis node occurred particularly where the artery altered its direction such as at its entrance into the sclera, its course through the lamina cribrosa, and in its course from the sclera toward the ciliary body.

In the present case the posterior ciliary arteries were severely diseased, while those of the choroid were moderately so. It is fair to assume that the destruction of the layer of rods and cones and the extensive subretinal exudation are to be traced to disease in the choroid. As regards the appearance of the fundus, the widespread pigmentary disturbance may be traced to the disturbance in the neuro-epithelial layer and perhaps also to the subretinal exudate. In explanation of infiltration of the disk and the lamina cribrosa, there was sufficient indication that there had been neuritis which was dependent on disease of the ciliary arteries supplying this region (the circle of inn). Although the widespread disturbance of neuro-epithelium was undoubtedly a factor, it is extremely doubtful that even this could have produced such rapid loss of vision. There are nevertheless two distinct anatomic grounds for the



Fig. 1. Drawing of left optic disc and adjacent fundus.

loss of vision. It would appear, however, that the more rapid and greater loss is to be attributed to the local change in the nerve and that the retinal lesion was contributory. What would have ensued had the patient survived is problematic, perhaps detachment, as in Bock's last case, would have resulted, due to separation of the epithelial layer."

LESLIE L. McCoy, M D

NOSE AND SINUSES

Meland, O N : The Treatment of Epitheliomas of the Nasolabial Fold. *Am J Roentgenol*, 1937, 38 730

Meland states that epitheliomas of the nasolabial fold grow slowly, but if they are once disturbed by abortive or inadequate treatment they are progressive and destructive. They extend along the lines of embryological development.

Protracted, fractionated radium therapy given at a distance is the method of choice, but the treatment must be given over a fairly large area. Protracted roentgen therapy will give similar results.

In recurrent carcinomas, the possibility of success is dependent upon the presence or absence of necrosis of cartilage and bone which is secondarily infected.

When adequate irradiation is not followed by healing, electrocoagulation followed by plastic reconstruction at a later date is advisable.

JAMES C. BRASWELL, M D

MOUTH

Patterson, N : Carcinoma of the Cheek. *Brit J Surg*, 1937, 25 330

Before 1926 the author had excised carcinomas of the cheek from the inside of the mouth, but was dissatisfied with the approach. Because of the possibility of sloughing of the overlying skin following the use of the diathermy electrode, and a tendency of the condition to recur anteriorly, he was often reluctant to make a very deep excision.

He then devised an operation in which the skin of the cheek was reflected upward and medialward from the entire area from a line extending downward in front of the lobe of the ear and forward along the border of the jaw. The facial artery and vein were excised from this region, and, if necessary, part of the masseter, ramus, or alveolus of the jaw could be removed. A wide removal with diathermy of the tumor was done, and the cheek closed. It is important to keep the mouth "pried" open several times a day until fear of contraction is past. The parotid duct was cut in all cases, but the gland should give no subsequent trouble. The procedure may well be divided into two stages, the skin pocket should be packed until granulations have formed.

A series of 10 cases was reported, only one known recurrence was seen, and there was no operative mortality. Glands of the neck were involved quite late from this primary location, and only one regional gland dissection was reported. If the overlying skin

was involved, it was excised, and a flap brought up from lower down on the neck for closure of the cheek, the defect on the neck was allowed to close itself.

JAMES BARRETT BROWN, M D

NECK

Frank, I., and Scheer, C : Sheath of the Internal Carotid Artery: A Route for Infections from Primary Lesions. *Ann. Otol., Rhinol. & Laryngol*, 1937, 46 912

The authors observed 2 cases of severe tonsillitis which led to meningitis, the pathway of the infection being through the carotid sheaths. From the literature they collected 87 cases in which endocranial complications followed buccopharyngeal infections. The pathways are postulated to be the venous channels, direct extensions of the phlegmon through the parapharyngeal space, eroded bone, and, finally, the lymphatics. All these structures have a close anatomical relationship to the carotid sheaths.

In the neck the carotid sheath forms part of the posterior parapharyngeal space. Here it is only incompletely separated from the tonsils and paratonsillar spaces. In extension upward, it is intimately connected with the dura mater in the carotid canal, subdurally with the cavernous sinus, and with the meninges in the central cerebral fissure.

The authors injected 24 dogs and 19 puppies. The injections were made into the sheath of the internal carotid artery. The material consisted of hemolytic streptococci, India ink, or tragacanth, alone or mixed with bacteria. A meningo-encephalitis was produced in 1 dog. Infiltration of the carotid sheath was produced in many dogs.

The carotid sheath thus seems to represent another important pathway of infection from the pharyngeal to the cranial structures. FRED S. MODERN, M D

Frankau, C, Pugh, G., Windeyer, B. W., Turner, P., and Others. The Management of Tuberculous Glands in the Neck. *Proc Roy Soc Med*, Lond, 1937, 31, 103

Frankau states that tuberculous infection of the glands is bovine in 90 per cent of the cases. The pathways of the infection are via the nasopharynx, the intestinal tract, and the mediastinum. The treatment should be conservative if the involvement is early and not yet caseous, if the infection is massive and advanced, or if the involvement is diffuse but not caseous. The treatment should be operative in caseation and old abscesses. Irradiation may be of value in certain cases. Tuberculin is valueless.

Radium treatment seems to be of definite value, according to Pugh. From 24 to 30 applications are necessary. The results seem to be lasting, of over 300 patients so treated, only 2 were readmitted. It is a distinct advantage for the irradiation therapy to be as long as possible, as this permits adequate constitutional treatment.

At Middlesex Hospital, Windeyer reports that cases have been treated by (1) surgery with radio-

therapy (2) roentgen irradiation and (3) radium irradiation. Irradiation seems to be definitely beneficial but only as an adjunct to proper general constitutional treatment. Septic foci must be removed and broken-down glands aspirated before irradiation is attempted.

P. Turner does not aspirate, but cures broken down glands and shrinks tonsils by ethyl iodocinnoleate. He believes that fistulas should be cured as thoroughly as possible.

Nicholls thinks that the disease is milder than formerly and that constitutional treatment is about as effective as surgery or irradiation.

The procedure varies with the virulence of the infection, according to Donald. In some cases small incisions with expression of the material are still satisfactory.

If the portal of infection is in the nasopharynx, G. Turner states that the whole cervical chain on both sides, if necessary, should be cleaned out. If the portal is in the trunk the general measures are more important than surgery.

FRED S. MODERN, M.D.

Sonek, C. F. Tumors of the Carotid Gland. A Case Operated Upon in Zuecinem (Ueber Carotis druesengeschwulste. Zuecinem in Finnland operierten Fall). *Finska lak sällsk handl.*, 1937, 5: 417.

Attention is directed to 236 cases of tumor of the carotid gland reported in the literature. The author does not consider that a number of these cases were definitely proved to be tumor of the carotid gland. He reports in great detail an operation for tumor of the carotid gland done in Abo in the year 1933. The histological examination showed that the tumor was apparently composed of a true neoplastic, but benign tissue. It had a pronounced alveolar structure and was surrounded by a connective tissue capsule. The specific epithelial like tumor cells lay in a network of delicate fibrillae and adventitial cells. The tumor tissue was everywhere rich in blood vessels. The morphology of the epithelial like cells is discussed in detail. In conclusion attention is called to the fact that the tumors of the carotid gland usually occur unilaterally. These tumors are encountered most generally in patients between twenty and fifty years of age. Women seem to be affected somewhat more often than men. The tumors generally grow very slowly. Periods of observation lasting for thirty-seven years are known. Frequently the extirpation is done only for cosmetic reasons in which case the operation not infrequently has a fatal result. This is true because the tumors are deep-seated and the operation is complicated. In about half of 180 cases described ligations and resections of the carotid artery were necessary. About 30 per cent of these operations ended fatally because of embolism or thrombosis. The general operative mortality is figured at 17 or 18 per cent.

For the extirpation the author recommends the procedure of Peterson: preparatory systematic com-

pression treatment of the common carotid artery and exploratory operation when the tumor cannot be removed without ligation of the common or internal carotid arteries.

The subjective symptoms from the tumor are often remarkably slight. Really severe pains set in only with malignant degeneration and rapid growth. The characteristic feature is a slight degree or absence of vertical mobility of the tumors, but there is a very distinct horizontal mobility. Previous to operation the diagnosis is correctly made only in the rarest of cases. The differential diagnostic points are described. (HAAGEN) LOUIS NEUWELT, M.D.

Mahorner, H. R. The Experimental Production of Goiter. *Arch. Surg.* 1937, 35: 937.

The author discusses the literature of the pathogenesis of thyroid hyperplasia, mentioning the roles of infection, diet, and ligation of the adrenal vessels, and the effect of the secretion of the anterior lobe of the pituitary gland. He gives references to the literature and mentions disparities in results. He made re-investigations and reports as follows:

In all the dogs used, control biopsies of the thyroid and gross measurements were made. There were no attempts to produce iodine deficiency. In 14 dogs foci of infection were set up in the sternocleidomastoid muscles, and the experiments were concluded at intervals of from four to sixty-four days. In all but 1 the infection was active at the termination of the experiment. In none was there any gross or microscopic evidence of alteration of the structure of the thyroid gland.

The author states: "The results in these experiments support the conclusion that a focus of infection in the dog does not produce changes in the thyroid gland suggestive of hyperplasia, at least within a period of thirty-two days."

Because an increased basal metabolic rate had been shown by previous investigators to follow partial excision of or injury to the adrenal gland, the author attempted to produce thyroid hyperplasia by damaging the adrenals. The methods used were crushing from one half to two thirds of the adrenals in 12 dogs and freezing both adrenals solidly with an ethylchloride spray in 7 dogs. In both series at intervals of from four to one hundred and twenty-seven days autopsy revealed neither gross nor microscopic evidence of hyperplasia nor retrogression of the thyroid gland.

The effect of a high calcium intake was determined in 6 dogs who were given calcium chloride in fairly large amounts in drink water. The blood calcium was elevated from 0.5 mgm. to 2 mgm. as a result of this regimen. Three dogs died on or prior to the twelfth day; in them no definite changes were determined.

In the 3 animals surviving for eighty-nine and one hundred and thirteen days, definite hyperplasia of the thyroid was found. The author concludes: "These experiments indicate that calcium eliminates the colloid from the thyroid gland and in-

creases the size of the epithelium. Thus, from these experimental results, at least, it does not seem that calcium chloride is the cause of colloid goiter but that it does change the histologic appearance of the thyroid gland "

In 5 dogs, 1 c cm of gonadotropic principle from the urine of pregnant women was injected. No gross or microscopic evidence of hyperplasia or other change in the thyroid gland was found.

Eight guinea pigs were given 1 c cm of extract from the anterior lobe of the pituitary gland daily. Four of the animals sacrificed on or prior to the eighth day revealed questionable hyperactivity, three sacrificed on the tenth, nineteenth, and thirty-second days revealed definite hyperactivity of the thyroid, as evidenced by reduction in size of the vesicles, diminution of the colloid, vacuolation and the increased height of the lining epithelium. One animal received daily injections for sixty-four days. Changes were not found. FRED S. MODERN, M.D.

Le Fort, R. A Human Thyroid Graft in a Case of Infantile Myxedema (Grefte de thyroïde humaine dans un cas de myxœdème infantile) *Presse méd.*, Par, 1937, 45 1771

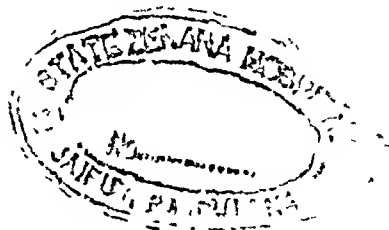
Le Fort reports a case of infantile myxedema in which a portion of the thyroid gland from a condemned criminal was grafted in the abdominal wall. This operation was done in 1925, when the child, a girl, was two years old, she presented the typical appearance of myxedematous idiocy, she had never spoken a word and showed no signs of intelligence. The thyroid graft was taken from the man immediately after his execution, about half of the right lobe of the thyroid was taken, placed in warm saline solution and rushed to the hospital, where the child was prepared for operation. The glandular tissue of the graft was exposed on one side, the graft was placed in the rectus muscle of the left side.

There was an immediate postoperative reaction with a rise in temperature to 38.3°C , an increase in the pulse rate, and loss of weight. As these symptoms subsided, the child showed definite improvement in both physical and mental development, she spoke a few words in less than two weeks after the operation. She has been under constant observation for twelve years, and now at fourteen is continuing to grow and to develop, although she is definitely backward, being physically and mentally at the level of nine years of age. This case has not been reported previously. ALICE M. MEYERS

Canuyt and Gunsett. The Method of Radiography, Tomography, or Planigraphy Applied to Cancer of the Larynx (La méthode des coupes radiographiques, tomographie ou planigraphie appliquée au cancer du larynx) *Presse méd.*, Par, 1937, 45 1559

Canuyt and Gunsett note that roentgenograms of the larynx taken by the usual method are not satisfactory. They have employed the method of tomography, or planigraphy, in which the roentgenograms are taken in different planes. The roentgenograms are taken from the front, plane by plane, showing the larynx, or any part of it, in projection. With this method, the laryngologist can study any particular area desired, or he can compare the structures of one side with those of the other.

The authors cite 5 cases of cancer of the larynx in which this method proved of definite value in diagnosis. In 2 of these cases the cancer (epithelioma) was unilateral, involving the pharynx also in 1 instance, and in 3 cases the growth was bilateral. In 1 case treated by deep radiotherapy, repeated examinations by this method showed considerable diminution in the size of the tumor. This method may prove of value not only for diagnosis, but also in the control of treatment. ALICE M. MEYERS.



SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS, CRANIAL NERVES

Asch C. Experiences with Subcutaneous Drainage of the Cisterna Magna (Erfahrungen mit der subkutanen Drainage der Cisterna cerebelli medullaris) *J internat de chir* 1938 3 1

The author summarizes the various theories about the secretion and absorption of the cerebrospinal fluid and of the measures that have been tried to date for treatment of chronic intracranial hypertension. She draws particular attention to the method of subcutaneous drainage of the cisterna magna first proposed by Westenhoeffer in 1903, and successfully carried out independently of him by Anton and Schmieden since 1917.

Thirty four cases are cited in which this method has been used in the treatment of chronic disease of which 13 are from Schmieden's series. She then lists 17 cases reported by de Quervain, namely 14 cerebral tumors, 1 cysticercus, and 2 cases of simple chronic hydrocephalus. De Quervain attempts to make this drainage more effective by fixing one or two bundles of silkworm gut against the hole in the atlanto-occipital membrane and leading them out into a subcutaneous pocket in the neck.

Five patients with cerebral neoplasm died during their stay in the hospital, some after several months, 1 died from pulmonary embolus and 2 following attempts at radical operation. Nine left the hospital with cerebrospinal fluid in a subcutaneous sac in the region of the back of the neck, and in 1 this was present seven years later. In 8 additional patients it was not possible to decide with certainty whether this sac had been formed.

Taking the whole series, one of the chief causes of death was compression of the cerebellum in the foramen magnum.

The best results were seen in 2 patients with chronic hydrocephalus. One was able to take up employment again to a certain extent and enjoyed excellent health after eight years; the other lost all papilledema and his visual acuity returned almost to normal, and after a period of three and one half years the suspicion of neoplasm was practically abandoned.

The symptoms of several patients were much relieved by repeated puncture of the artificial sac.

The author believes, with Schmieden, that this operation is to be recommended in supratentorial tumors. She agrees with Schloffer that when the tumor is below the tentorium the procedure should be avoided as the possibility of future lumbar puncture is to be borne in mind. This method of drainage of the cisterna magna finds its chief use in the cases of patients with chronic hydrocephalus where it has the advantages of simplicity and comparative harmlessness.

Pattison A R D. Supracallosal Epidermoid Cholesteatomas. *Lancet* 1931 233 1303

The author describes 2 cases of epidermoid cholesteatoma which are of unusual interest because the tumors were situated in the supracallosal region. Although 142 cases of epidermoid cholesteatoma have been reported in the literature (1913-36), none were described as having arisen in this region of the brain.

The tumors are congenital and their favorite site of origin is along the primary fissures of the embryonic brain. In those cholesteatomas arising above the corpus callosum the epithelial implantation probably occurred along the longitudinal cerebral fissure. Cholesteatomas occur in various places in the diploe of the cranial bones and they are known to occur in the temporal bone. The lesion in the latter location is thought to be due to the degenerative changes that follow chronic epithelial desquamation, though not all of such lesions can be explained on this basis. The highly complicated development of the temporal bone makes it an ideal place for ectodermal inclusions.

The first of the author's two patients was admitted to the hospital as an emergency case shortly after a convulsive seizure and died three days after his admission. An autopsy was performed which is fully reported in the original article.

The second case was that of a young woman with headache, vomiting and attacks of unconsciousness. A ventriculography was done and the patient was successfully operated upon with removal of practically all of the tumor. The case is also carefully described and discussed in the original article.

It is interesting to note that the slow progression and intermittent character of the complaint led to a diagnosis of multiple sclerosis in each case. In both cases the symptoms were strikingly similar: slow progression, low grade papilledema and convulsions, and in accord with reports on the intracranial cholesteatomas by other authors.

In discussing the nomenclature the author states that he is of the opinion that the qualifying term epidermoid or dermoid would seem to be adequate in describing intracranial cholesteatomas and that the term cholesteatoma is used merely in deference to tradition and usage.

ADRIEN VERBULGEN, M.D.

Wakeley C P G. The Surgery of the Pineal Organ. *Brit J Surg* 1935 25 561

The author discusses the various phases of the development, function and anatomical arrangement of the pineal organ. He calls attention to the calcification of the pineal gland which can be shown in roentgenograms in about 70 per cent of adult skulls while calcification in the choroid plexus is found in about 5 per cent of adults. The symptoms of pineal tumors are due not only to the size of the lesion but

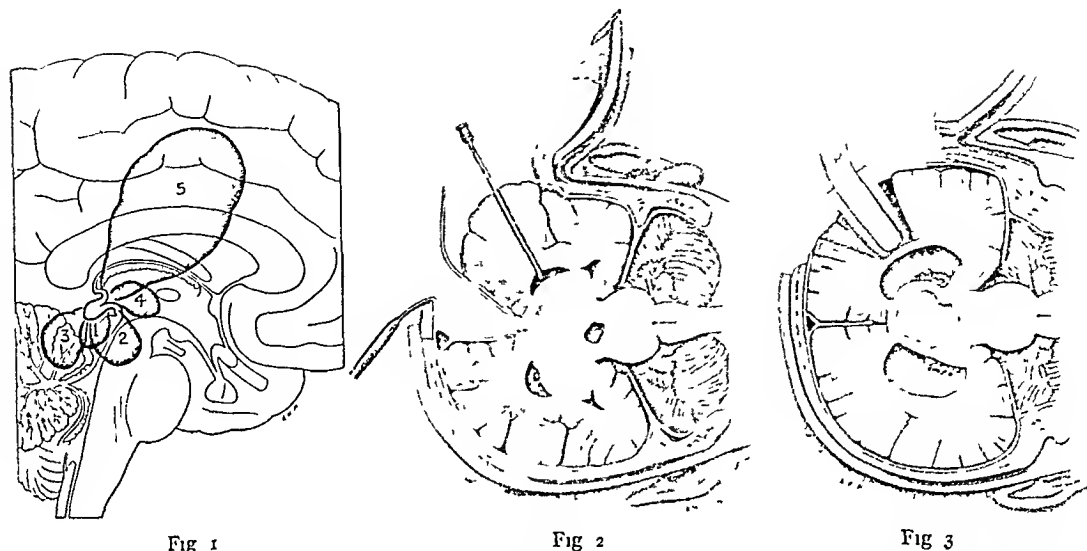


Fig 1

Fig 2

Fig 3

Fig 1 Schematic representation of the various ways in which a pineal tumor may extend and cause pressure symptoms (1) on the corpora quadrigemina, (2) on the aqueduct of Sylvius, (3) downward on the cerebellum, causing cerebellar symptoms, (4) on the midbrain, and (5) on the cerebral hemisphere. Fig 2 The posterior part of the cerebral hemisphere is retracted so as to expose the corpus callosum. Fig 3 Sectional view of the approach to a pineal tumor through a dilated lateral ventricle.

also to the direction in which it grows, as shown in Figure 1. The author divides the symptoms first into the focal signs, which are produced as a result of the anatomical position of the pineal tumor. The superior corpora quadrigemina may be involved, and eye signs such as loss of pupillary reaction, reaction to accommodation upward, downward, and lateral movement, in the order named, may occur. It is extremely common to find that the light reflex is absent and the patient is unable to look upward. The aqueduct of Sylvius may be occluded and produce a severe degree of internal hydrocephalus with the associated symptoms due to increased intracranial pressure. One of the factors to be considered in the production of internal hydrocephalus is the likelihood of the compression of the vein of Galen with resultant engorgement of the choroid plexus, which may produce an increased secretion of spinal fluid. Patients may show cerebellar symptoms as a result of extension of the tumor into the cerebellum. As the tumor grows, extension may occur upward into the hemispheres, with involvement of the optic radiations and the resultant right or left homonymous hemianopia.

Constitutional manifestations of pineal tumors are almost confined to the male sex. Occasionally there is a disturbance of growth associated with pineal tumors, which affects chiefly the genital organs. This disturbance is often associated with adiposity and sometimes with general and symmetrical overgrowth.

The author discusses the common pathological conditions arising in the region of the pineal body,

such as cysts, cholesteatomas, teratomas, pinealomas and pineoblastomas.

The methods of approach and removal of pineal tumors are presented. The author prefers rectal avertin anesthesia, and local infiltration of the scalp with $\frac{1}{2}$ per cent novocaine, followed by the intratracheal administration of gas and oxygen. The intratracheal gas-oxygen anesthesia makes certain that the patient is completely quiet during the deep approach to the pineal gland and, at the same time, permits the use of oxygen or carbon dioxide if the patient should stop breathing. The methods of Dandy and Van Wagenen are described. The approach of Dandy is shown in Figure 2, while the method of Van Wagenen is illustrated in Figure 3. Eight cases of pineal tumors are reported in detail.

ROBERT ZOELLINGER, M D

SYMPATHETIC NERVES

Wertheimer, P., and Bérard, M: *Surgery of the Cervicothoracic Sympathetic Chain (La chirurgie de la chaîne sympathique cervico-thoracique)*. *J de chir*, 1938, 51 31.

Among the operations on the sympathetic nervous system, excision of the stellate ganglion is done most frequently because of many varying indications, but the results of this operation are not constant. One of the authors (Bérard) previously pointed out that the results of sympathectomy in angina pectoris are improved by extension of the resection toward the thoracic chain. These conclusions are based not only on the authors' personal experience but also on the



Fig 1

results obtained by Leriche, Fontaine, White and others. Wertheimer and Berard have recently employed the technique of Gask and Ross with resection not only of the lower cervical but also of the upper thoracic chain in the treatment of angina pectoris, paroxysmal tachycardia and vasomotor disturbances which are found in the upper extremities.

It is true that the more important afferent sympathetic nerve fibers supplying the upper extremities and the heart pass through the stellate ganglion. However, certain nerve branches coming from the second thoracic ganglion enter the lower root of the brachial plexus directly and also cardiac and pulmonary nerve fibers originate in the second, third and fourth thoracic ganglia and their anatomical and physiological independence has been definitely demonstrated by various investigators. It would seem, therefore, that the fibers originating in the second thoracic ganglion must be sectioned to ensure sympathetic denervation of the upper extremity and that in angina pectoris the resection should be carried even further along the thoracic chain. There is a definite advantage in preserving the stellate ganglion, especially as degeneration of the postganglionic fibers is avoided if the peripheral sympathetic fibers



Fig 2

Figs 1 and 2 The thoracic sympathetic chain

can be disconnected from the cerebrospinal centers without removal of this ganglion.

With the technique of Gask and Ross as used by the authors, a subclavicular incision about 1 cm below the clavicle is employed. The stellate ganglion is exposed from below upward and the upper thoracic chain is easily identified, lying above the vertebral bodies slightly to the side. The second thoracic ganglion and sometimes the third ganglion is exposed. A segment of the sympathetic chain is resected below the stellate ganglion. The stellate ganglion may also be resected according to the technique of Leriche. Local anesthesia is employed for the operation and the injections are best made plane by plane as the operation proceeds and thus the danger of puncturing a small blood vessel is avoided.

In one of the cases operated upon by the authors, a small pneumothorax developed after operation, but the air was absorbed within a few days. Another postoperative complication that may occur is temporary paralysis of the diaphragm due probably to injury to a prolongation of the phrenic nerve in the course of operation. This paralysis is usually of short duration but if a bilateral sympathectomy is to be done, the second stage of the operation should be delayed until it has entirely disappeared.

Five illustrative cases are reported: one of paroxysmal tachycardia and 4 of vasomotor disturbances in the upper extremities in which operation by the technique of Gask and Ross gave good results.

ALL F. M. MEYERS

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Portmann, U. V.: Classification of Mammary Carcinomas to Indicate Preferable Therapeutic Procedures. *Radiology*, 1937, 29 397

A classification for cases of mammary carcinomas is desirable and should be adopted. It should be based upon the clinical and pathological evidences of the extent of the disease, and it should indicate the method of treatment to be preferred in each individual case. A completely satisfactory classification has not been previously developed. Such a classification is suggested by this author. He divides the cases into three groups, each of which is shown to represent the prognosis and indications for therapeutic procedures. The classification is as follows:

Group I (a) Tumor definitely localized in the breast and movable, (b) skin not involved, (c) metastases not present in the axillary lymph nodes

Group II (a) Tumor localized in the breast and movable, (b) skin not affected, or only very slightly edematous or ulcerated, (c) metastases present in the axillary lymph nodes, but only a few involved.

Group III (a) Tumor diffusely involving the breast, (b) skin involved (edema or ulceration), and multiple nodules present, (c) metastases to numerous axillary lymph nodes or to other tissues, such as supraclavicular nodes, lungs, and bones

The patients in Group I should be operated upon radically but should not be irradiated. Almost 100 per cent of these patients will survive for five years. This group comprises about 30 per cent of all cases of mammary carcinoma.

The patients in Group II should have radical operative removal of the breast and axillary contents, and in addition they should be given irradiation postoperatively. About 50 per cent of such patients will survive five years if radical operation is the only treatment, and at least 75 per cent will survive that long if irradiation is added to the operation. This group comprises about 25 per cent of all cases.

The patients in Group III with clinical manifestations of incurability should not be subjected to radical surgical procedures. These patients should be treated by irradiation alone to prolong their lives. This group comprises about 45 per cent of all cases.

The clinical manifestations of incurable breast cancer are:

1. Manifestations affecting the skin: (a) edema (pig-skin or orange-peel dimpling) even of moderate degree, (b) brownish-red induration and inflammation, (c) multiple nodules, (d) ulceration.

2. Manifestations affecting the breast: (a) edema, (b) diffuse infiltration, (c) multiple secondary tumors; (d) fixation of the breast or of the tumor to the chest wall.

3. Manifestations of metastases: (a) axillary lymph nodes, numerous or fixed, (b) supraclavicular metastases, or edema of the arm, (c) distant metastases, such as those in the lungs, bones, or other organs.

A thorough search should be made for the clinical manifestations of incurability which are enumerated above, and patients with any of them should not be subjected to radical operation, but should be given irradiation alone.

J. DANIEL WILLEMS, M.D.

Pfahler, G. E.: The Treatment of Carcinoma of the Breast. *Am J Roentgenol*, 1938, 39 1.

According to United States Vital Statistics, there were 6,665 deaths from cancer of the breast in 1920 and 10,204 deaths in 1929, and it has been stated that there were 13,000 in 1933. Since the average length of life before death from carcinoma of the breast is from three and one-half to four years, and since probably 20 per cent of all cases are permanently cured, we have a right to assume that approximately 50,000 women in the United States have cancer of the breast at the present time.

Pfahler groups carcinoma of the breast into three stages. In the first stage there is a small isolated movable tumor in the breast with no palpable lymph nodes and with no roentgenological evidence of intrathoracic or skeletal metastases. In the second stage there are larger tumors in the breast which are fixed to the skin or pectoral muscles, with palpable axillary lymph nodes or microscopic evidence of axillary metastases. In the third stage the tumors in the breast are associated with axillary lymph nodes and supraclavicular or distant metastases. The treatment in the first stage is radical operation or radical operation with postoperative irradiation. The treatment in the second stage should consist of pre-operative irradiation, followed promptly by radical operation and then postoperative irradiation. In the third stage the author uses irradiation only, or irradiation plus operation if the disease can be made operable. Following this, postoperative irradiation should be given. The prognosis is variable; after operation in the first stage 70 per cent of the patients may be alive and well at the end of five years. If the post-operative irradiation is added to operation, 71 per cent may be alive and well after five years. Of the patients in the second stage 28 per cent may survive for five years when operation alone is done, whereas if pre-operative irradiation is given followed by operation and postoperative irradiation, 57 per cent may be alive and well in five years. Of the patients treated in the third stage probably not more than 5 per cent are alive and well at the end of five years. Irradiation may accomplish prolongation of life and relief of pain.

Pfahler discusses the theoretical and biological evidence favoring pre-operative irradiation. He

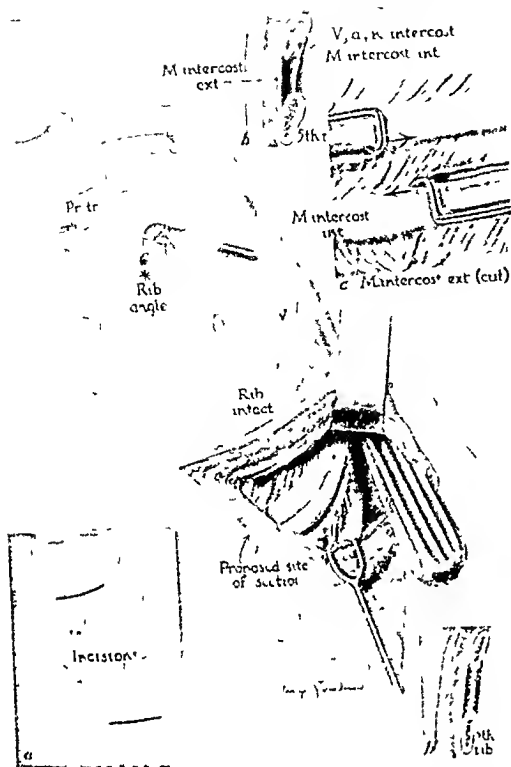


Fig 1 The first stage of complete costectomy—the anterior operation. The periosteal stripper is being pushed along the lower margin of the fifth rib. The stripper can be pushed as far as the angle of the rib posteriorly. The muscles of the lateral thoracic wall are elevated on a retractor in the interspace as the periosteotomy is pushed along the lower edge of the rib. *a*, The anterior incisions. *b*, The nature of attachment of the external and internal intercostal muscle fibers to the ribs in the vicinity of the angle of the rib, on the upper rib, shown in this insert, it is apparent that the periosteal stripper pushed posteriorly along the lower margin of the rib will detach only the fibers of the external intercostal muscles. On the lower rib, however, it is evident that the stripper will detach both internal and external intercostal muscle bundles. *b'*, The nature of attachment of external and internal intercostal muscle fibers to the rib ventral to the axillary line. It is apparent that the periosteal stripper will separate both muscles from the rib when pushed along the borders of the rib. *c*, The direction of insertion of the external intercostal muscle bundles accounts for the simplicity of this method of rib removal. The internal intercostal muscle fibers, it is to be observed, run in the reverse direction

the external intercostal muscle bundles upon the ribs. On the upper side he begins behind and strips in a forward direction, on the lower margin the rib is freed by stripping in the opposite direction.

Two remarkably lucid drawings accompany the article, which illustrate well the technical details of both operations. J. DANIEL WILLIAMS, M.D.

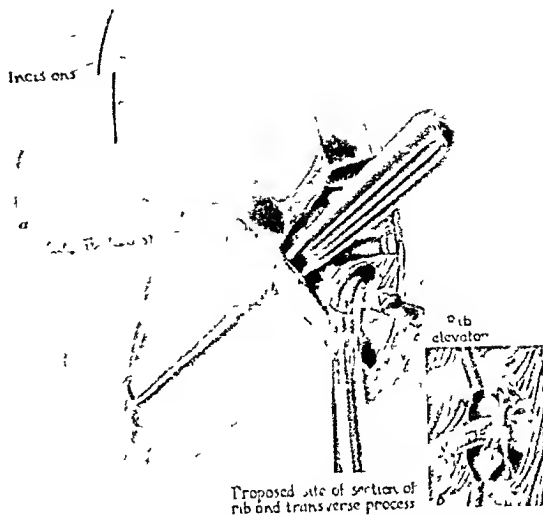


Fig 2 The posterior operation in which the ribs are removed. The stripper is being pushed in a forward direction along the superior border of the rib. After exposure of the rib through the incision as shown in Fig 2a, the costotransverse articulation is exposed (Fig 2b) by cutting and separating the short and long levator muscles of the rib as well as the multifidus and intertransverse muscles and the intertransverse and costotransverse ligaments. After all the ribs to be removed have been sectioned, the rib is rotated into the wound and its separation from its periosteal bed proceeds as shown. Elevation of the muscles of the chest wall on a retractor in the intercostal space is a valuable expedient which facilitates this procedure.

TRACHEA, LUNGS, AND PLEURA

Goldman, A., and Adams, R. Endobronchial Probing Combined with Serial Selective Bronchography Fluoroscopically Controlled. *Ann Surg*, 1937, 106 976

This article describes a method of endobronchial probing with selective bronchography under the control of the fluoroscope.

The apparatus used consists of a large, radiopaque Thompson bronchial catheter with curved tip, and of radiopaque ureteral catheters of different sizes. Palpable markers are placed on the latter at two points, the first one at a distance from the tip equal to the length of the bronchial catheter, and the second one 5 cm further distant. The smaller catheter is inserted into the larger one, and the markers enable the operator to know in the dark the distance which the ureteral catheter protrudes beyond the bronchial catheter. A semi-rigid metal stillette or introducer, and a metal syringe for injecting oil through the ureteral catheter complete the equipment, with the addition of a combination fluoroscopic and roentgenographic tilt table.

The patient is prepared with a suitable dose of phenobarbital, and one and one-half hours later

cocaine hydrochloride is introduced for anesthesia. The proper bronchial catheter is fitted with the introducer and placed through the epiglottic ring under mirror vision. The catheter is then passed through the larynx into the trachea. The ureteral catheter is now inserted into the bronchial catheter and exploration carried out under fluoroscopic control. The ureteral catheter is pushed slowly beyond the bronchial catheter and can be introduced into any desired branch bronchus. Details of any isolated branch can be clearly shown by instillation of a drop or two of iodized oil. Spot films may be made at any time. If necessary the small catheter may be withdrawn and larger amounts of iodized oil instilled through the bronchial catheter. Permanent radiographic records can be made as desired either as 'spot films' or as serial films.

J. DANTEL WILLEMS M.D.

Ostrowski T. and Bross W. Operative Treatment of Bronchiectasis by Means of One Stage Lobectomy (Zur operativen Behandlung der Bronchiectasen mittels einseitiger Lobektomie). *Arch f. Klin. Chir.* 1937 183 509.

The author refers to both acquired and congenital bronchiectasis. The acquired types are caused by infectious diseases measles whooping cough bronchopneumonia but also as the result of eccentrically acting forces and furthermore by atelectases. The authors saw such an instance following the obstruction of the right main bronchus by a collar button. The opinion that these bronchiectases can also be caused by thromboses of the bronchial arteries is as yet not sufficiently corroborated. The researches of Sauerbruch and his school showed that 80 per cent of bronchiectases occurring during childhood are congenital and these findings were supported by the pathologico-anatomical researches of Roessle.

Cough which in children is not constant is never absent in adults. Occasional traces of blood may be found in the sputum fatal hemoptysis may occur. Usually there is no fever but in the late stages there may be either irregular or continuous high fever. Bronchography with lipiodol or iodipin has brought us much further in the diagnosis of this condition as physical examination does not reveal any specific findings. Stratigraphy and tomography have brought us still further.

Medical treatment has indeed led to improve merits but not to cures. Pneumothorax phrenicectomy is and thoracoplasty do not lead to the desired goal. Sauerbruch regards the extrapleural paraffin inlay as the method of choice in children. Lobectomy is today generally considered the method of choice. The authors then discuss the various techniques especially the multiple stage operations and the operations which do and those which do not require any preceding preparation.

Sauerbruch favors the multiple stage procedure in which he applies an elastic band around the hilum in order to leave a spontaneous line of demarcation upon the lobe. Brunn favors the one stage removal

of the lobe with closing of the wound and a permanent pull upon the superficial surface of the lung by means of suction drainage. Roberts and Nelson also discarded the preceding pneumothorax as they gradually opened the chest cavity and permitted the air to enter slowly.

Ostrowski presents detailed histories with illustrations in 2 cases which he treated by operation. In these cases he carried out the treatment according to Roberts in that he employed his loop, he also used suction drainage according to the method of Brunn. He says that the dangers of one stage lobe removal in cases in which there is a free tear in the pleura have been overestimated up until now. When the general condition is favorable this is the operation of choice.

With regard to complications the one most to be feared is shock following the constriction of the hilum which makes itself evident in the decreased blood pressure dyspnea and attacks of coughing. Notwithstanding the general anesthesia it is necessary to infiltrate the hilum with novocaine. Hemorrhages may occur from the hilus as well as from the cut strands of the pleura. By means of the suction drainage hemorrhages can undoubtedly be favorably influenced. Bronchial fistulas usually close up and heal spontaneously. Inflammatory conditions of the lung resulting from aspiration must be prevented by the patient being placed in the Quincke longitudinal position or by bronchoscopic aspirations. (FRANZ HARRY A. SALZMAN M.D.)

Jacob H. W. and Baker M. R. Primary Apical Lung Cancer Producing the Symptomatology of a Superior Pulmonary Sulcus Tumor Report of a Case. *Radiology* 1937 29 525.

Opinions regarding the origin of malignant tumors of the pulmonary apex and thoracic inlet vary widely. These tumors may arise from structures of the neck such as sympathetic ganglia or persistent bronchial cleft tissue or from the mucosa of the terminal bronchioles in the apex of the lung. The clear cut symptomatology and clinical and recent roentgenographic findings they present seem to be related more to the location of the tumors than to any uniform histogenesis. A case which presented typical findings of a superior pulmonary sulcus tumor is reported in detail. At autopsy this tumor proved to be a squamous cell carcinoma originating in the apex of the lung and invading the ribs vertebrae and soft tissues of the neck.

ADOLPH HARTUNG M.D.

Mastick W. L. and Burke E. At. Primary Bronchogenic Carcinoma from the Pathological and Radiological Points of View. *J. Am. M. Ass.* 1937 109 2221.

The author found 73 cases of carcinoma of the bronchus among 18,000 malignancies in their institution a ratio of 1 to 250. In their post mortem examinations this lesion was noted to be half as frequent as carcinoma of the stomach and it was

five times more frequent in males than in females. The greatest prevalence of the disease was between the ages of forty and seventy years, the highest incidence occurring in the fifth decade.

While universal pleomorphism was generally present, it was usually possible to group the tumors on a histopathological basis. Of the 62 cases studied histologically, there were 6 cases of adenocarcinoma, 40 of squamous-cell lesions, and 16 of anaplastic tumor. The hilus, or centrally located lesion, was from four to six times more frequent than the peripherally located lesion. Fifteen per cent of the authors' cases were atypical in that the symptoms were due to metastases and not to the primary lesion.

Diagnosis, even with the aid of roentgenograms, is often difficult, and any unilateral pulmonary lesion in a person who is past middle age should be viewed with suspicion until it is proven non-malignant. Lateral projections, bronchography with iodized oil, and pneumothorax are often of great diagnostic value.

The predominating roentgenographic characteristics in the authors' series, in the order of frequency, were as follows: atelectasis, 42 per cent, increased markings, 21.9 per cent, tumor mass, 13 per cent, pleural effusion, 15 per cent, and abscess or cavitation, 9 per cent.

The authors are not convinced of the efficacy of radiation therapy, yet they use continued protracted radiation, and, where indicated, endobronchial radon seed implants, or endothermic coagulation. They find few cases suitable for surgery, and few patients who are willing to submit to it.

EARL O. LATIMER, M.D.

Ormerod, F. C. The Pathology and Treatment of Carcinoma of the Bronchus. *J. Laryngol. & Otol.*, 1937, 52, 733.

The present summary is based on 100 consecutive cases in each of which a portion of the growth was removed through the bronchoscope, and its malignant nature demonstrated histologically. Of the 100 patients, 92 were men and 8 were women. Their average age was fifty-one and seven-tenths years. There was a slight but definite preponderance of cases on the right side: 58 on the right and 42 on the left.

For inclusion in the list, all the tumors must have had at least an intrabronchial portion, so that specimens could be removed for biopsy, but in many the extrabronchial portion was greater. The appearance of the tumors seen bronchoscopically varied from the smallest nodule to a cauliflower-like mass completely filling the main bronchus. The majority of the tumors had an irregular granular surface, somewhat paler than the normal bronchial mucous membrane, and on removal of a portion for examination they were found to be extremely soft in consistency. A few were harder and of a deeper red and in one or two instances the tumor was so firm that it was difficult to obtain a portion for microscopy. They

showed only a slight tendency to bleed when a portion was removed, in contrast to the benign tumors, which all bled freely when cut.

It is an interesting fact that on passage of the bronchoscope into the bronchus after routine cocaine anesthesia, there is very little tendency to cough in normal cases, as well as in cases in which a neoplasm is present. In the case of an inflammatory disease, such as bronchiectasis or lung abscess, it is more difficult to abolish the reflexes, and there is a considerably greater tendency to cough.

Malignant disease of the lung must be differentiated from bronchiectasis, lung abscess, gumma, mediastinal tumor, and benign tumor of the bronchus.

The 100 cases under review included 62 cases of squamous-cell carcinoma and 38 cases of non-squamous-cell carcinoma. The two types pursue the same clinical course, the average age, however, of the squamous-cell carcinoma is about five years more than that of the other type. There is also a greater tendency to degeneration and cavity formation in the squamous-cell type. When the results of the treatment were discussed there appeared to be some slight difference in response, but a much larger series of cases would have to be investigated before any very definite conclusion could be reached.

The large majority of the patients seen were too far advanced to permit lobectomy and pneumonectomy and it was found necessary to attempt the destruction of these growths by less radical procedures, such as the introduction of radon into the bronchus or the insertion of seeds directly into the tumor mass. In spite of certain advantages of the direct implantation of seeds over the use of containers, the majority of the patients who have survived more than one year were treated by means of containers, however, some very long survivals have been achieved from the direct insertion, fifty-three months in one case. Both methods have their place, and a decision as to which shall be used can be made only after bronchoscopic examination. The object of the treatment is twofold: to destroy the growth and to open up the bronchus and drain and aerate the lung distal to the obstruction. Of the 100 cases under review, 28 were untreated and 72 were treated. Sixty-seven were treated with radon, 4 were referred to a surgical clinic for operation, and 1 was subjected to diathermy. The 4 patients who were operated upon died within a short time, the patient treated by diathermy lived for eleven months. Among the cases treated by radon there were a number of strikingly successful results. The average life of the untreated patients was three and five-tenths months and of the treated patients seven and eight-tenths months. The squamous-cell growths appeared to have a slightly longer life than the non-squamous. It is believed at the Brompton Hospital that when there is not a reasonable prospect of complete removal of the growth by surgical measures, radon treatment should always be carried out except when the patient is obviously dying.

JOSEPH K. NARAT, M.D.

Koster H Kasman L P and Rosenblum J A
Suggested Method for More Rapidly Curing
Empyema *Ann Surg.*, 1937 106 992

In the past fifteen years aspiration closed continuous drainage open thoracotomy with or without rib resection irrigation with various types of solutions and air replacement after aspiration have been advocated for empyema

The authors have treated, between 1929 and 1934 118 cases with rib resection and open drainage All of the patients were operated upon under spinal anesthesia An opening large enough to admit inspection and digital examination was made the cavity was thoroughly emptied by suction a drainage tube was placed in the cavity, and the wound was packed Five patients had a prolonged convalescence because of complications The other 113 had complete recovery in an average of forty five days

A new method of treatment of empyema has been presented by the authors which consists of closed drainage with the production of compression of the contralateral lung by artificial pneumothorax From seven to ten days after the termination of the active pneumonic process closed intercostal drainage was instituted From two to three days later artificial pneumothorax was produced on the unaffected side of the chest Air was then injected and the pneumothorax was maintained by repeated injections under roentgenographic and fluoroscopic control Immediately after the production of the pneumothorax the patient breathed deeper and more rapidly A copious discharge from the drainage tube followed a short time later In adults the average duration of drainage was twenty-one and two tenths days and the average duration from the beginning of drainage to healing was twenty five and one half days

It was found that even in cases of empyema tidal air was not diminished by producing a pneumothorax artificially on the side opposite the empyema

J DANIEL WILLEMS M D

HEART AND PERICARDIUM

Blalock A and Levy S E Tuberculous Pericarditis *J Thoracic Surg.*, 1937 7 137

The authors report 47 cases of tuberculous pericarditis from the Vanderbilt Hospital during the past eleven years In 24 cases the diagnosis was proved and in 18 it was strongly suspected

The cases are divided into four groups for the purpose of analysis

Group I was composed of patients with active tuberculous constrictive pericarditis on whom pericardiectomy was performed There were 6 patients all males All had been ill for months With one exception they were forty years or more of age The chief complaint was dyspnea and cough All had prominent veins with a venous pressure ranging from 195 to 300 mm of water a paradoxical pulse a low pulse pressure distant heart sounds a fixed heart with little or no visible pulsation under the

fluoroscope an enlarged liver pleural effusion and ascites All had marked thickening of the pericardium and epicardium and 1 showed a moderate amount of calcification Large areas of thickened scars were removed in all instances and microscopic study revealed active tuberculous infection Three of the 6 patients were cured or greatly benefited and 3 died 2 died of military tuberculosis months after operation, and 1 died a few minutes after operation

Group II was made up of patients in whom tuberculous pericarditis was the chief cause of death but on whom pericardiectomy was not performed This group consists of 7 patients All died and autopsies were performed on 6 of them The complaints were similar to those in Group I Drainage of the pericardium was carried out on 2 patients and large quantities of fluid 400 and 1000 ccm were removed Tuberculous pericarditis was not the only lesion in these patients All of the autopsies revealed tuberculosis of the mediastinal lymph nodes and there was active pulmonary infection in all but 2

Group III was composed of patients with proved tuberculous pericarditis which was a contributing but not the chief cause of death In this group there were 9 patients Seven were males and the ages ranged from two to sixty years The duration of illness varied from two weeks to two and one half years Eight of these patients showed systemic congestion 1 had an acute effusion with 500 ccm of fluid in the pericardial cavity at autopsy Aspiration of the pericardium was attempted in 3 patients 2 of whom yielded fluid which was found to be positive on guinea pig inoculation The third died of hemopericardium following apiration The causes of death were acute disseminated tuberculosis in 5 cases pneumococcal pneumonia in 1 prostatic bronchopneumonia in 1 cardiac hypertrophy and dilatation with multiple infarcts in 1 cerebral tuberculous meningitis in 1 and hemopericardium in 1 Autopsy was performed in 8 cases

Group IV The patients in this group were strongly suspected of having tuberculous pericarditis but its presence was not proved There were 15 males and 3 females The ages varied from twenty to sixty years The complaints were dyspnea cough pain in the chest and edema The duration of illness varied from one day to many years Ten of the patients had a pericardial rub There was enlargement of the heart a pericardial shadow in 15 patients and a paradoxical pulse in 8 Eight of the patients died but there was no autopsy 3 are partially and 2 are totally incapacitated and 4 are well J DANIEL WILLEMS M D

Benedetti Valentini F A Contribution to the Surgical Treatment of Pick's Syndrome (Leontoblastoma) *Atti del Congresso internazionale di chirurgia* Roma, 1937 44 222 224

The author presents a case of Pick's syndrome secondary to a tuberculous polyserositis with involvement of the pericardium The patient was a

sixteen-year-old boy who, when seen at the clinic, presented the picture of a severe polyserositis involving the pleura, pericardium, and peritoneum. After repeated paraenteses and pericardial punctures the condition of the patient became progressively worse although the general ascites had retrogressed. After subsidence of the acute symptoms the patient developed a veritable cardiohepatic cirrhosis with ascites, Pick's syndrome. Following a severe convulsive seizure marked by contractions of the left facial musculature and by ocular deviations, the author, upon the patient's request, decided to interfere surgically.

Under morphine and local novocain anesthesia a horseshoe incision was made and following resection of the third to the ninth ribs the pericardial space was freed and a capillary drain was introduced which was removed after twenty-four hours. This is called the Brauer operation. The immediate postoperative condition of the patient was fair, but within twenty-four hours the patient's condition became progressively worse. A paracentesis was made and about 4 liters of fluid were removed after which the condition rapidly improved.

Encouraged by the good results obtained from surgical intervention, the author decided to complement the operation with a left phrenicoexeresis. This procedure has proved always to be very useful in the hands of those surgeons who have applied it in the treatment of adhesive pericarditis or as a preliminary step in precordial thoracotomy. In this case the author performed a phrenicoexeresis following Brauer's operation for the first time.

Under local anesthesia of the cervical plexus, an incision 4 cm. long was made above the clavicle with its center at the level of the posterior border of the sternocleidomastoid muscle. The phrenic nerve was identified and excised and the patient made an uneventful recovery. When seen again after eight months, the boy reported that he felt considerably better.

With reference to the surgical method to be chosen in cases of Pick's syndrome developing in the course of a tuberculous polyserositis, the author gives preference to (1) a rapid, efficacious and least shock-

producing surgical intervention, and (2) an intervention which is least apt to mobilize and disseminate tuberculous foci. He believes, therefore, that the operation should be performed extrapericardially.

RICHARD E. SOMMA, M.D.

ESOPHAGUS AND MEDIASTINUM

Ellison, R. T.: *Mediastinal Hernia*. *Radiology*, 1937, 29: 556

The author has reviewed the origin of mediastinal hernia and considered the mechanism of its development. Mediastinal hernia is defined as a projection through the mediastinum of one pleural space into the other hemithorax. Artificial pneumothorax is still the most common cause of hernia of the mediastinum, although the latter also occurs in spontaneous pneumothorax. There are two so-called "weak spots" in the mediastinum. One lies between the sternum and the front of the heart at the site of the atrophied thymus, the second lies further below and posteriorly and is a space bounded below by the crura of the diaphragm, posteriorly by the spinal column, and in front by the esophagus as it bends forward to pass through the diaphragm. What are the physical factors that lead to the development of such a herniation of the mediastinum? It is obvious that the mediastinum itself must be considerably more rigid than the "weak spot"; otherwise the mediastinum as a whole would be shifted with the lowest pressure. A difference of pressure on the two sides of the mediastinum can be brought about in either of two ways: either the pressure on one side can be raised above normal, or the pressure on the other side can be lowered below normal. The author gives a discussion of the physical forces which cause this phenomenon.

The traction type of hernia of the mediastinum is much less common, in this type the forces causing the herniation are due to a loss of volume of one lung and an increase in the negative pressure in that hemithorax, so that the lung from the normal hemithorax is drawn through the mediastinal "weak spot." The author gives a case report illustrating this type of herniation.

PAUL MERRILL, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Jonsson S O Torsion of the Omentum (Ueber Omenttorsionen) *Acta chirurg Scand* 1937 90 251

Torsion of the omentum is one of the rare acute conditions treated by abdominal surgery though hardly as rare as it would appear from the statistics to be found in the literature (Morris 193 277 cases). In the last ten years the author has found 6 cases at the Serafimerhospital and 1 at the Örebro Hospital. The predisposing factors are abnormal bulkiness and weight of the omentum and adhesions along its free border which cause a drag and lead to pedunculation. These factors are present especially in cases of hernias containing omentum and torsions of omentum are therefore often combined with epiplocele. Acute inflammatory processes can also be the cause of torsion though probably only when pedunculate extensions which are not uncommon in the right part of the omentum already exist.

The usual distinction and probably the best from a clinical point of view is between (1) torsion only in the hernial sac (2) torsion both in the hernial sac and in the abdominal cavity and (3) torsion without hernia (a) unipolar (b) bipolar.

Torsion of the omentum has been correctly diagnosed before operation only in a very few cases. If the abdominal symptoms predominate the case is diagnosed as acute abdominal disease usually as appendicitis if the hernial symptoms predominate the case is judged to be one of incarcerated hernia. The author calls attention to the danger of confusion in the former case with appendiceal abscess and in the latter with incarcerated hernia and warns especially against the danger of error when the torsion is double with one apical in the hernial sac and another proximal to this at the place where the omentum is adherent to the colon. The author believes that in all cases of torsion in the hernial sac and for that matter in any case of torsion in the peripheral part of the omentum the operating surgeon should make sure by a laparotomy incision if necessary that there is not another torsion higher up. He believes this should be ascertained regardless of the appearance of the abdominal exudate and of the omentum above the peripheral torsion. He is confirmed in this opinion both by his own case and by several cases in the literature.

The other 6 cases related by the author belong to the group of simple abdominal torsions. The cause in one case was hernia although at the operation the hernial pouch was found to be empty. In another it was lymphangioma in the omentum in a third possibly acute appendicitis and in the remaining 3 cases the condition was idiopathic. In connection with 1 of the cases the author briefly discusses the similar disease, torsion of the epiploic appendages. He calls

attention to the fact that torsion of the omentum can give rise to a more chronic pathological picture with recurring abdominal pains suggesting chronic appendicitis.

Harris F I and White A S The Length of the Inguinal Ligament *J Am M Soc* 1937 109 1900

There is a definite relationship between the length of the inguinal ligament and the occurrence of either a direct or indirect inguinal hernia. Individuals with an inguinal ligament less than 11 cm in length have very little tendency to acquire an inguinal hernia.

Hernias occurring in individuals whose inguinal ligament measures from 11 to 15 cm are of the indirect type. Hernias occurring in individuals whose inguinal ligament measures from 15 to 29 cm are always of the direct type.

Recurrences following the repair of inguinal hernia are more frequent in patients with long inguinal ligaments.

The longer the inguinal ligaments are the shorter is the relative distance between the anterior superior iliac spines. In such cases the pelvis is of greater depth. Conversely the shorter the inguinal ligament the more shallow is the pelvis. In indirect hernias the pelvic floor is relatively flat and the intra-abdominal pressure is exerted more evenly over the entire inguinal ligament. In direct hernias the pelvic floor is markedly inclined and the intra-abdominal pressure is exerted more particularly near the midline. This seems to explain logically the formation of direct inguinal hernias in patients with long inguinal ligaments. SAMLER KAHN M D

GASTRO-INTESTINAL TRACT

Andersen M Gastrographic Studies and the Administration of Food Through a Duodenal Tube *Acta med Scand* 1937 93 431

In order to obtain tracings in experiments with the administration of food through a duodenal tube a thin rubber balloon was tied around a small tube and passed into the stomach. It was then inflated with air and the other end of the tube which was connected to a Marey's tambour made tracings on a kymograph. These recorded tracings or gastrograms showed characteristic features: (1) small waves synchronous with the respiratory movements; (2) larger waves differing in height and length produced by contractions of the stomach; (3) irregular sporadic waves which were produced by the patient when he was moving, speaking, coughing or sighing.

Normal individuals as well as those with gastroduodenal pathological conditions gave curves of an essentially uniform appearance but the waves appeared slightly higher in those who were not normal.

A difference was found between the contraction waves of an empty stomach and those of a full stomach. The empty stomach showed varying contraction phases, that is, beginning with relatively small waves, the contractions increased in frequency and intensity to maximum, or so-called "hunger contractions." After a certain period of time this phase turned rather suddenly into a phase of "absolute rest." The appearance of the curve changed when the stomach was filled to a certain degree, and showed lower, wider waves, or so-called "relative rest." The longest "relative rest" was produced by meals rich in protein and fat.

Normal persons had contraction phases without any pain, but individuals with gastroduodenal pathological conditions were found to have pain when the contraction phase occurred. Hunger pains were dependent exclusively on movements of the stomach, especially the empty stomach, and bore no relation to the acidity of the stomach contents.

These findings suggested frequent filling of the empty stomach and thus conflicted with the theoretical basis of feedings, through the duodenal tube. This fact led to the following investigations and results.

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Every examination began with tracings of typical "hunger contractions." After these had been recorded for about five or ten minutes, the patient was given from 200 to 300 c cm of an "intestinal meal." An intestinal meal consists of 100 gm of olive oil, 30 gm of wheat flour, and 50 gm of sugar, stirred together with 300 gm of water. After the mixture has been boiled and cooled, 6 beaten eggs (300 gm), the juice of $\frac{1}{2}$ lemon (15 gm), and 1,250 gm of raw whole milk are added. This makes an average portion for one day, and is given in from five to ten meals.

The results were quite uniform in all the cases, namely, "absolute rest" occurred immediately. This phase started immediately after the beginning of the food injections into the duodenum.

The duration of the "absolute rest" was found to be highly variable, ranging from twenty minutes to three hours and twenty minutes. The resting period was followed by a period of relatively weak contractions which resembled the contractions which were recorded with a full stomach and designated as "relative rest." Later these contractions turned into typical "hunger contractions." In the 6 cases examined, the total duration of the resting periods was from thirty minutes to more than three hours and forty minutes. After a new period of hunger contractions had been recorded a new injection was

given through the duodenal tube, the immediate appearance of "absolute rest" again resulted.

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RICHARD J BENNETT JR MD

Allen, A. W.. Acute Massive Hemorrhage from the Upper Gastro-Intestinal Tract. *Surgery*, 1937, 2 713

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In a previous study of 371 bleeding duodenal ulcers occurring over a ten-year period at the Massachusetts General Hospital, Allen found that 22.6 per cent of the patients had hematemesis only, 38.3 per cent had melena only, and 39.1 per cent had both hematemesis and melena. While the most frequent source of such massive hemorrhage from the upper gastro-intestinal tract is the duodenal ulcer, there are several other types of lesions which produce the same picture. These are gastric ulcer, gastric carcinoma, gastrojejunal ulcer, esophageal varices, leiomyosarcoma, and hypertrophic gastritis.

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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Jonsson S O Torsion of the Omentum (Omentortionen) *Acta chirurg Scand* 1935, 80 251

Torsion of the omentum is one of the rare acute conditions treated by abdominal surgery though hardly as rare as it would appear from the statistics to be found in the literature (Morris 1932 217 cases). In the last ten years the author has found 6 cases at the Serafimerhospital and 1 at the Örebro Hospital. The predisposing factors are abnormal bulkiness and weight of the omentum and adhesions along its free border which cause a drag and lead to pedunculation. These factors are present especially in cases of hernias containing omentum and torsions of omentum are therefore often combined with epiplocele. Acute inflammatory processes can also be the cause of torsion though probably only when pedunculate extensions which are not uncommon in the right part of the omentum, already exist.

The usual distinction and probably the best from a clinical point of view is between (1) torsion only in the hernial sac (2) torsion both in the hernial sac and in the abdominal cavity and (3) torsion without hernia (a) unipolar (b) bipolar.

Torsion of the omentum has been correctly diagnosed before operation only in a very few cases. If the abdominal symptoms predominate the case is diagnosed as acute abdominal disease usually as appendicitis if the hernial symptoms predominate the case is judged to be one of incarcerated hernia. The author calls attention to the danger of confusion in the former case with appendiceal abscess, and in the latter with incarcerated hernia and warns especially against the danger of error when the torsion is double with one spiral in the hernial sac and another proximal to this at the place where the omentum is adherent to the colon. The author believes that in all cases of torsion in the hernial sac and for that matter in any case of torsion in the peripheral part of the omentum the operating surgeon should make sure by a laparotomy incision if necessary that there is not another torsion higher up. He believes this should be ascertained regardless of the appearance of the abdominal cradate and of the omentum above the peripheral torsion. He is confirmed in this opinion both by his own case and by several cases in the literature.

The other 6 cases related by the author belong to the group of simple abdominal torsions. The cause in one case was hernia although at the operation the hernial pouch was found to be empty in another it was lymphangioma in the omentum in a third possibly acute appendicitis and in the remaining 3 cases the condition was idiopathic. In connection with 1 of the cases the author briefly discusses the similar disease torsion of the epiploic appendages. He calls

attention to the fact that torsion of the omentum can give rise to a more chronic pathological picture with recurring abdominal pains suggesting chronic appendicitis.

Harris F J and White A S The Length of the Inguinal Ligament *J Am Med Ass* 193 109 1900

There is a definite relationship between the length of the inguinal ligament and the occurrence of either a direct or indirect inguinal hernia. Individuals with an inguinal ligament less than 35 cm in length have very little tendency to acquire an inguinal hernia.

Hernias occurring in individuals whose inguinal ligament measures from 31 to 35 cm are of the indirect type. Hernias occurring in individuals whose inguinal ligament measures from 35 to 39 cm are always of the direct type.

Recurrences following the repair of inguinal hernia are more frequent in patients with long inguinal ligaments.

The longer the inguinal ligaments are, the shorter is the relative distance between the anterior superior iliac spines. In such cases the pelvis is of greater depth. Conversely, the shorter the inguinal ligament the more shallow is the pelvis. In indirect hernias the pelvic floor is relatively flat and the intra-abdominal pressure is exerted more evenly over the entire inguinal ligament. In direct hernias the pelvic floor is markedly inclined and the intra-abdominal pressure is exerted more particularly near the midline. This seems to explain logically the formation of direct inguinal hernias in patients with long inguinal ligaments. SAUERBAUM M D

GASTRO-INTESTINAL TRACT

Andersen M Gastrographic Studies and the Administration of Food Through a Duodenal Tube *Acta med Scand* 1937 93 437

In order to obtain tracings in experiments with the administration of food through a duodenal tube a thin rubber balloon was tied around a small tube and pushed into the stomach; it was then inflated with air and the other end of the tube which was connected to a Marey's tambour made tracings on a kymograph. These recorded tracings or gastrograms showed characteristic features: (1) small waves synchronous with the respiratory movements; (2) larger waves differing in height and length produced by contractions of the stomach; (3) irregular sporadic waves which were produced by the patient when he was moving, speaking, coughing or sighing.

Normal individuals as well as those with gastroduodenal pathological conditions gave curves of an essentially uniform appearance, but the waves appeared slightly higher in those who were not normal.

A difference was found between the contraction waves of an empty stomach and those of a full stomach. The empty stomach showed varying contraction phases, that is, beginning with relatively small waves, the contractions increased in frequency and intensity to maximum, or so-called "hunger contractions." After a certain period of time this phase turned rather suddenly into a phase of "absolute rest." The appearance of the curve changed when the stomach was filled to a certain degree, and showed lower, wider waves, or so-called "relative rest." The longest "relative rest" was produced by meals rich in protein and fat.

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In the early hours of acute massive hemorrhage from duodenal ulcer, if the patients are under fifty

years of age with elastic blood vessels, conservative measures are indicated because it is unlikely that they can be operated upon and the vessels be ligated with a mortality of less than 5 per cent. In the older age group we can use Finsterer's much quoted forty-eight hour time limit to advantage.

The deep penetration of the posterior wall ulcer into pancreatic tissue, at a point where the gastroduodenal artery traverses it increases not only the risk of continued bleeding but makes any operative procedure one of major consideration. One can hardly expect to open the anterior wall of the duodenum and successfully place ligatures in this friable ulcer bed, nor can one pass stitch ligatures in such a way as to occlude the vessels in healthy tissue from within. This method has succeeded only in isolated instances. Finsterer advocates direct tamponade in some extensive ulcerations into the pancreas with a later secondary resection after recovery from acute blood loss and shock. In a large group of patients with active bleeding ulcer he has successfully ligated the bleeding vessels and resected the distal two-thirds of the stomach with a low 5 per cent mortality if the operation was undertaken within forty-eight hours after the onset of the bleeding. In the patients with ulcers bleeding one week or more the mortality has been 30 per cent. Finsterer apparently believes that by excluding the extensive deeply penetrating ulcer on the posterior wall of the duodenum by transection of the duodenum proximal to the ulcer or by transection of the antrum fingerbreadths from the pylorus and then by removing the distal two thirds of the remaining stomach his end results are nearly as good as when the ulcer in the duodenum is included in the resection. Finsterer calls this operation resection for exclusion. The author is of the opinion that in doing this operation the radicles leading into the ulcer bed are ligated. Many surgeons have found gastro-enterostomy a failure for the treatment of massive hemorrhage in duodenal ulcer.

In the quiescent or interval stage of duodenal ulcer of the posterior wall, especially after one or more episodes of massive bleeding one is confronted with the problem of proper treatment. If the patient is young and responds well to a dietary regimen we may justly consider that radical surgery is meddlesome. Certainly some of these patients manage to get along comfortably and safely for many years. In those individuals with recurrences of massive hemorrhages we believe that radical surgery makes possible a safer and more comfortable life. In 38 consecutive cases of duodenal ulcer of the posterior wall the author resected the distal one third or two thirds of the stomach and when possible the ulcer bearing portion of the duodenum and followed this with a posterior Eloya anastomosis. All of the 38 patients had bled severely but all recovered from the operation and remained well for varying periods of time. Some of them developed new ulcers either at the stoma or on the lesser curvature of the remaining portion of the stomach. In each case of newly formed ulcer there

have been episodes of hemorrhage. None of these patients have thus far died from hemorrhage. They were undoubtedly protected from fatal bleeding by the ligation of the large vessels overlying the head of the pancreas. However their ulcer diathesis and their hemorrhagic tendency as well have not been altered. The author is now trying a more radical resection of the stomach.

Details as to the conservative management of massive hemorrhage have not been considered a part of this discussion. However certain aspects demand consideration. The author has never seen a patient die as a direct result of a blood transfusion but we have all seen patients die from the lack of a transfusion. Everyone is in accord with regard to the importance of blood replacement. Sedation of the actively bleeding patient has been a questionable procedure. Finsterer warns against too much morphine in these depleted patients prior to operation, however the restless stage of shock may be decidedly harmful and doubtless there is a proper middle course. An inlying Levine tube may be worthy of consideration. The tube allows aspiration of gastric and salivary secretion which may hinder clot formation. It serves to identify fresh episodes of bleeding. Without doubt it serves to minimize peristaltic activity and eliminates vomiting which in itself may dislodge a life saving thrombus in an open vessel. The entire basis of treatment consists of perfect rest, quiet and comfort.

JOHN W. NELSON, M.D.

Golden R. Antral Gastritis and Spasm. *J. Am. M. Ass.* 1937 109 2407.

The author presents a discussion of gastritis and its roentgenological interpretation. The cause of the condition is unknown. It begins in and may be limited to the mucosa but frequently extends to the deeper layers. It has been pointed out that as far as the motility is concerned the antrum is the most important part of the stomach and consequently its inflammatory changes in this region may produce serious disturbances in gastric function. This condition has been termed antral gastritis and may produce any or all of the symptoms of peptic ulcer such as pain, hemorrhage and vomiting. The diagnosis depends mainly on gastroscopic and x-ray examination. Some writers have noted that in many cases there are no changes which can be demonstrated by the x-ray but the author is convinced that certain cases may be recognized with the x-rays by a study of the changes in the gastric form and function.

Normally, as the narrow peristaltic wave enters the antral region its relaxing edge decreases and its contracting edge increases in speed. In this way a portion of the lower end of the stomach is closed off. This results usually in expulsion of the gastric contents. Then the wall relaxes promptly and the lumen returns to its normal width and contour. This is known as antral systole. The author's observations suggest that antral systole is associated with

contraction of the longitudinal muscle toward the pylorus. In the normal stomach the mucous membrane is freely movable over the muscle. Forssell has demonstrated that the formation of mucosal folds is the result of the contraction of muscularis mucosae. In some cases the mucosal folds in the antrum run irregularly in a transverse direction, and when antral systole occurs they appear to change direction and run nearly parallel with the long axis of the stomach. For this change to take place there must be a movement of the mucous membrane in a cephalad direction which stretches it tightly beneath the muscular contractions. Failure of this mechanism may account for the occasional observation of herniation of the prepyloric mucosal folds through the pylorus.

Movement of the mucous membrane may be disturbed by inflammatory changes of the muscularis mucosae and the submucosa. Edema of the mucosa has been frequently noted. Changes about and within the ganglion cells may interfere with the function of the mural nerve plexuses. In any event, the following disturbances in motility have been observed:

- 1 Peristalsis may be very irregular in depth and timing. The waves seem stiff and fail to develop into antral systoles.

- 2 Prepyloric narrowing due to spasm may be present.

- 3 Pylorospasm may be present.

In addition there is frequently delay in emptying and there may be mucosal erosions.

There is evidence to indicate that gastritis is an important factor in the production of hypertrophy of the pyloric muscle. The most important x-ray sign in this condition is elongation of the pyloric channel with preservation of the mucosal folds.

The differential diagnosis of antral gastritis from carcinoma may be difficult. Pressure methods to demonstrate mucosal folds in the narrowed area are particularly helpful. Ordinarily the folds are obliterated by an infiltrating carcinoma. If atrophic changes are present the diagnosis becomes even more difficult. A palpable mass in the antral region favors the diagnosis of carcinoma. The writer has found atropine of little value in the study of these cases but recommends gastric lavage and repeated examination. If doubt persists, however, operation is advised.

JOHN A. GRIS, M.D.

Morley, J.: Carcinoma of the Stomach. *Brit. M. J.*, 1937, 2, 949.

The author discusses the theories concerning the cause of carcinoma of the stomach. He points out that 82 per cent of chronic ulcers of the stomach but only 13 per cent of gastric carcinomas occur in the middle two-thirds of the lesser curvature. On the other hand, only 12 per cent of chronic ulcers occur in the prepyloric region, while 66 per cent of the gastric carcinomas occur in that region. This is given as evidence against the contention that carcinoma is secondary to chronic ulcer. Furthermore,

the average duration of symptoms in the author's series of cases of carcinoma was twelve and seven-tenths months as compared to ten and three-tenths years in cases of ulcer. It is not denied that malignant transformation in an ulcer may occur, but it is less frequent than is often stated. The author does not hold to Hurst's view that chronic gastritis is a common predisposing cause of carcinoma.

Carcinoma of the stomach is classified according to location: (1) carcinoma of the cardiac end of the stomach, (2) carcinoma of the body of the stomach, and (3) pyloric and prepyloric carcinoma. The symptoms depend to a great extent on the location of the lesion.

The earliest symptoms of carcinoma of the stomach usually are a vague discomfort after meals and an unaccountable failure of appetite. The patient is usually over forty years of age and has not suffered from indigestion before. With the failure of appetite there is a steady loss of weight and, as a rule, a progressive development of anemia.

In carcinoma of the cardiac end of the stomach, there is commonly an early onset of dysphagia due to stenosis of the cardiac orifice. Only a roentgenological examination will differentiate this condition from carcinoma of the lower end of the esophagus.

Obstruction is most unusual in lesions of the body of the stomach. In some patients loss of appetite may be the only early symptom. Other patients may have a feeling of flatulent distention of the stomach and eructation of gas with an offensive odor. Anemia and weakness are progressive, as well as loss of weight. X-ray examination reveals the lesion or confirms the diagnosis.

Lesions of the pyloric end of the stomach are most common and most hopeful. They are hopeful because the obstruction often occurs early and the growth is accessible for surgical removal. In the presence of stenosis, pain is the most marked feature. Visible peristaltic waves may be seen in some patients. A palpable mobile tumor is not a contra-indication to surgery in the opinion of the author.

Late symptoms are secondary deposits of tumor in the liver and peritoneum. In each sex the pouch of Douglas should be examined for hard secondary tumors. In the female a pelvic examination may reveal large secondary ovarian masses known as Krukenberg tumors. Jaundice and ascites are very late symptoms of metastases.

The differential diagnosis may at times be difficult. In pernicious anemia the distress after taking food is slight or absent and rapid loss of weight is rare. Examination of the blood and x-ray studies will confirm the diagnosis.

Simple peptic ulcer may simulate a carcinoma of the stomach, and *vice versa*. If x-ray examination shows the lesion on the duodenal side of the pylorus, then the presence of an ulcer is assumed. Failure to heal after adequate treatment for about three weeks and the persistence of blood in the stool justify surgical interference.

Gastrectomy is the treatment of choice when feasible. Gastro enterostomy to relieve obstruction may be the only surgery possible. At times surgery is not advisable either because there is no obstruction and the lesion cannot be removed, or because the patient cannot stand a surgical procedure.

EARL O LATIMER M.D.

Gordon Taylor G. The Problem of the Bleeding Peptic Ulcer. *Brit J Surg* 1937 25 403

This article is essentially a presentation of the surgical attitude on the bleeding of chronic ulcer. The subject is considered under the ten following subdivisions—

1. "The role of surgery as a prophylactic measure." The prevention of hemorrhage has often been presented as an especially powerful argument in favor of early surgical intervention for peptic ulcer. The correct answer as to whether surgery really is a prophylactic measure against a possible hemorrhage in patients with a chronic peptic ulcer of the stomach or duodenum depends upon such relative considerations as

- a The incidence of severe hemorrhage in patients with chronic peptic ulcer
- b The risk to life associated with the hemorrhage
- c The prospective protection afforded by the operation against hemorrhage
- d The mortality of that particular surgical measure which seems to promise the highest degree of protection against future bleeding

The first of these or the incidence of hemorrhage is answered by Gordon Taylor from the available statistics which show that approximately 10 per cent of all patients with chronic peptic ulcer suffer from hemorrhage, although a history of hematemesis or melena may be obtained in from 20 to 25 per cent of the more severe cases of ulcer admitted to private or public hospitals.

The second of these considerations or the risk to life from ulcer hemorrhage is extremely difficult to determine because of apparently conflicting statistics. Much difference of opinion occurs on what really is severe ulcer bleeding and Gordon Taylor concludes that "The chances run by the possessor of a chronic peptic ulcer of succumbing to hemorrhage from ulcer are not likely to be greater than 1 in 80 and no worse than 2 5 per cent if consideration is limited to those ulcer patients whose condition is such that they require hospitalization."

The third of these factors or the prospective protection afforded by operation against hemorrhage is answered by the conclusion that there is no type of operation which will give absolute assurance. The author has had 3 patients who had never bled prior to operative interference and who experienced hemorrhage for the first time only after the duodenum and a considerable portion of the stomach had been resected.

The fourth consideration or the prospective mortality of a difficult operation to prevent hemorrhage from a peptic ulcer, is met by the argument that

such a mortality will of course vary with the nature of the procedure and the experience skill and judgment of the surgeon as well as the patient's general condition. In experienced and competent hands resection and resection for exclusion have a mortality of somewhat over 3 per cent. This is the acme of surgical skill and experience. This figure is however at least as great as and may be greater than that of deaths from hemorrhage in cases of peptic ulcer.

The final conclusion on this first heading of prophylaxis by Gordon Taylor is "Operation undertaken solely on grounds of prophylaxis against bleeding is therefore to be discountenanced."

2. Under the second heading or "The Place of Surgery in Non bleeding Cases with a History of One or More Hemorrhages," the author states that every case should be considered on its own merits. Gordon Taylor realizes that surgery does not afford complete immunity from future hemorrhage and concludes that a mere history of a single hemorrhage in a patient known to have a chronic peptic ulcer is not an indication for surgery but in every case the final determination to operate should probably rest upon the degree of ill health and the inability of the patient to earn a livelihood.

3. The third consideration or "Cases Presenting a First Hemorrhage" tells us that these cases also are not to be governed by hard and fast rules. Therapy should be guided by consideration of each case separately. A policy of armed expectancy should be adopted.

4. The fourth consideration or "Cases Presenting a Second or Later Hemorrhage" states that these cases call for an immediate consultation between physician and surgeon even despite the fact that subsequent hemorrhages have been known to follow operation. The bias of the consulted opinion should veer toward surgical intervention which should be of a very radical character.

5. The fifth subject under consideration was "The Question of Operation During Active Bleeding or After Its Cessation." In 40 per cent of the fatal cases death takes place within three days and in 25 per cent on the third day itself. The hemorrhagic period of chronic bleeding ulcer usually lasts for several days and it is the rapid recurrence of bleeding which may prove fatal.

6. The treatment of the last group of patients is considered under "A Suggested Outline for the Treatment and Indications for Surgery in Cases of Hematemesis." The first step in therapy should be the immediate preparation of donors so that even one half gallon of blood of the same or a suitable group can be available should necessity arise. If the bleeding is more than slight as determined by the pulse rate of 100 or more and the hemoglobin estimate at 50 per cent, drip transfusion should be instituted immediately. Every case of hematemesis should be admitted to a fully organized and equipped hospital where immediate transfusion is possible. The indications for surgery are

- a An immediate operation when it becomes obvious that a large blood vessel has been eroded
- b Immediate operation in the rare case of concomitant hemorrhage and perforation
- c Early operation in those ulcer hemorrhages in which drip transfusion is failing to control the hemoglobin because moderate bleeding is continuing
- d When the hemoglobin has reached 60 per cent the following type of patients should be operated upon

- (1) Patients with large penetrating ulcers whether bleeding be slight or severe and despite a short history
- (2) Cases with a long and definite ulcer history whatever the degree of bleeding, because the ulcer will be fibrotic and there will be ulceration of a definite vessel
- (3) Cases of pyloric or duodenal stenosis with slight or severe bleeding
- (4) Certain cases of midgastric narrowing
- (5) Cases in which a second hemorrhage has occurred within a year and where there is even only a probable ulcer history. If the second hemorrhage has followed soon after the first the indications are even more cogent

In all these clinical types delay in operation may be associated with grave perils. *Every case must be considered on its own merits. There can be no hard and fast rule.* Antecedent disease and intercurrent illness, the previous habits of the patient, his physical conformation, all of which determine whether the patient is a good or bad surgical risk, must be carefully evaluated, the personal courage of the patient as well as of the surgeon, the environment of the case, and the technical skill of the surgeon, all are factors which should not only influence the physician and surgeon in determining the desirability of surgery, but may also dictate the technique appropriate to every case.

7 "Nature of the Surgery Employed." The object of surgery is to arrest hemorrhage, and Gordon-Taylor has at times availed himself of such varied surgical measures as gastrostomy or duodenotomy with ligation of the bleeding vessel or vessels, pyloric exclusion and gastrojejunostomy, cauterization of the ulcer and gastrojejunostomy, sleeve resection, gastrectomy, which may be local or partial, gastroduodenal resection, Finsterer resection for exclusion, exclusion of duodenal ulcer with some form of specific operation on the pylorus and jejunum. No one measure is routinely utilized.

A bleeding anastomotic ulcer may be treated by complex and complicated resection, or it may also be dealt with by an approach through the stomach wall. Despite the great uncertainty of the indirect operation as a measure for securing hemostasis in a bleeding duodenal ulcer, the author has achieved some of his greatest successes by gastrojejunostomy with pyloric occlusion.

The time factor is of greater importance, however, than surgical technique and perhaps almost as valuable as surgical judgment. Early operation is

as important for success in hemorrhage as it is in perforation.

The importance of the anesthesia cannot be overestimated. If the operation cannot be completed under local or splanchnic anesthesia, gas-oxygen may be added.

Emphasis is also placed on avoiding heavy morphinization of these patients. The danger of lung complications in patients heavily dosed with morphine is a real menace. The cough reflex is the watch dog of the lungs and morphine and heroine have indirectly killed thousands by the abolition of this cough reflex.

8 "Results of the Surgical Treatment of Bleeding Chronic Peptic Ulcer" are summarized in four periods.

a The period of 1919 to 1924 was an interval characterized by the author as that of enthusiastic surgery for active ulcer hemorrhage. During this time 20 of 22 patients recovered from the operation, a mortality of 9 per cent. The operations were almost all early, in the first day or two of the bleeding, and many were done in the first twenty-four hours.

b During the period from 1924 to 1926, 10 patients with severe hemorrhage from chronic gastric or duodenal ulcer had a mortality of 40 per cent.

c The 1926 to 1933 interval is interesting in that the author was in consultation on 43 cases of chronic ulcer hemorrhage and operated on only 10. Eight of the patients recovered and the 2 who died were both patients operated upon after six or seven days of recurrent bleeding. In the remaining 33 cases there was a mortality of 24 per cent.

d From 1933 to 1937 surgery was utilized in 22 cases, of which 15 could be classified as early cases, some being operated upon within twenty-four hours. This group had only 1 death, which was due to bronchopneumonia. In the remaining 7 cases, all of which were late ones, 1 death followed a resection for a large penetrating duodenal ulcer which had perforated and had been sutured eight days previously. A second patient died from pneumonia, and a third from a separation of the suture line, probably due to devitalization of the tissues.

9 Under the ninth subdivision, or "Hematemesis and Perforation," which occurred in 9 patients, the author had 3 deaths, but fortunately this type of concomitant pathology is rare.

10 The final, or tenth subdivision, "Hemorrhage from Anastomotic Ulcer," was considered by Hurst's findings which have shown that practically 50 per cent of hospitalized anastomotic ulcers had bled, but that despite the severity of the hemorrhage only 1 of the 22 fatal cases was secondary to the bleeding. Because of this reputed low mortality, surgical intervention should be postponed unless the hemorrhage is very severe. Gordon-Taylor has found that severe bleeding from a jejunal ulcer may be con-

Gastrectomy is the treatment of choice when feasible. Gastroenterostomy to relieve obstruction may be the only surgery possible. At times surgery is not advisable either because there is no obstruction and the lesion cannot be removed or because the patient cannot stand a surgical procedure.

EARL O. LATIMER, M.D.

Gordon Taylor, G. The Problem of the Bleeding Peptic Ulcer. *Brit J Surg* 1937 25 403

This article is essentially a presentation of the surgical attitude on the bleeding of chronic ulcer. The subject is considered under the ten following subdivisions—

1. The role of surgery as a prophylactic measure. The prevention of hemorrhage has often been presented as an especially powerful argument in favor of early surgical intervention for peptic ulcer. The correct answer as to whether surgery really is a prophylactic measure against a possible hemorrhage in patients with a chronic peptic ulcer of the stomach or duodenum depends upon such relative considerations as

- a. The incidence of severe hemorrhage in patients with chronic peptic ulcer
- b. The risk to life associated with the hemorrhage
- c. The prospective protection afforded by the operation against hemorrhage
- d. The mortality of that particular surgical measure which seems to promise the highest degree of protection against future bleeding

The first of these or the incidence of hemorrhage is answered by Gordon Taylor from the available statistics which show that approximately 20 per cent of all patients with chronic peptic ulcer suffer from hemorrhage although a history of hematemesis or melena may be obtained in from 20 to 35 per cent of the more severe cases of ulcer admitted to private or public hospitals.

The second of these considerations, or the risk to life from ulcer hemorrhage is extremely difficult to determine because of apparently conflicting statistics. Much difference of opinion occurs on what really is severe ulcer bleeding and Gordon Taylor concludes that "The chances run by the possessor of a chronic peptic ulcer of succumbing to hemorrhage from ulcer are not likely to be greater than 1 in 80 and no worse than 25 per cent if consideration is limited to those ulcer patients whose condition is such that they require hospitalization."

The third of these factors, or the prospective protection afforded by operation against hemorrhage is answered by the conclusion that there is no type of operation which will give absolute assurance. The author has had 3 patients who had never bled prior to operative interference and who experienced hemorrhage for the first time only after the duodenum and a considerable portion of the stomach had been resected.

The fourth consideration or the prospective mortality of a difficult operation to prevent hemorrhage from a peptic ulcer, is met by the argument that

such a mortality will of course vary with the nature of the procedure and the experience skill and judgment of the surgeon as well as the patient's general condition. In experienced and competent hands resection and resection for exclusion have a mortality of somewhat over 3 per cent. This is the acme of surgical skill and experience. This figure is however at least as great as, and may be greater than that of deaths from hemorrhage in cases of peptic ulcer.

The final conclusion on this first heading of prophylaxis by Gordon Taylor is "Operation undertaken solely on grounds of prophylaxis against bleeding is therefore to be discounted."

2. Under the second heading or "The Place of Surgery in Non-bleeding Cases with a History of One or More Hemorrhages" the author states that every case should be considered on its own merits. Gordon Taylor realizes that surgery does not afford complete immunity from future hemorrhage and concludes that a mere history of a single hemorrhage in a patient known to have a chronic peptic ulcer is not an indication for surgery, but in every case the final determination to operate should probably rest upon the degree of ill health and the inability of the patient to earn a livelihood.

3. The third consideration, or "Cases Presenting a First Hemorrhage" tells us that these cases also are not to be governed by hard and fast rules. Therapy should be guided by consideration of each case separately. A policy of armed expectancy should be adopted.

4. The fourth consideration or "Cases Presenting a Second or Later Hemorrhage" states that these cases call for an immediate consultation between physician and surgeon even despite the fact that subsequent hemorrhages have been known to follow operation. The bias of the consultant opinion should veer toward surgical intervention which should be of a very radical character.

5. The fifth subject under consideration was "The Question of Operation During Active Bleeding or After Its Cessation." In 40 per cent of the fatal cases death takes place within three days and in 25 per cent on the third day itself. The hemorrhage period of chronic bleeding ulcer usually lasts for several days, and it is the rapid recurrence of bleeding which may prove fatal.

6. The treatment of the last group of patients is considered under "A Suggested Outline for the Treatment and Indications for Surgery in Cases of Hematemesis." The first step in therapy should be the immediate preparation of donors so that even one-half gallon of blood of the same or a suitable group can be available should necessity arise. If the bleeding is more than slight as determined by the pulse rate of 100 or more and the hemoglobin estimate at 50 per cent, drip transfusion should be instituted immediately. Every case of hematemesis should be admitted to a fully organized and equipped hospital where immediate transfusion is possible. The indications for surgery are

a fibrin deposit on the serosal surface, an ulcerated mucosa, phlegmonous mural changes, and hyperplastic glands in the adjacent mesentery. In more advanced cases the inflammatory process assumes a more chronic character, with mucosal ulcerations, fibrosis especially in the submucosa, round-cell and plasma-cell infiltrations, and also occasionally tubercle-like granulation tissue with foreign-body giant cells, but without necrosis, cheesy transformation, or calcification. Even in the early stages the lumen may be constricted by exudation and edema, but the stenosis is still more marked when shrinking and often marked wall thickening by fibrosis, cell infiltration, and muscle hypertrophy are added. Chronic perforation with abscess formation, fistulas from the ileum into adjacent adherent parts of the gut, or externally with drainage through healed appendectomy scars characterize the later stage of the disease.

Clinically, there are four disease pictures, which alternate or singly accompany the condition: (1) acute abdominal symptoms, usually interpreted as appendicitis, (2) symptoms suggesting ulcerative colitis, such as diarrhea, stabbing pains around the umbilicus or in the lower part of the abdomen, loss of weight, subfebrile temperature, and slight secondary anemia, (3) symptoms of stenosis, and (4) fistulas.

Later publications report similar changes in the jejunum, also in the colon together with terminal or regional ileitis. Occasionally it appears as if a primary ileitis had spread to and involved the colon in a secondary invasion. The changes in the ileum described by Crohn closely simulate the picture of inflammatory tumors of the colon and also that seen in rectal strictures resulting from lymphogranuloma inguinale. Additional experiences did not substantiate the statement of Crohn regarding the exclusive localization of the disease in the terminal ileum. The term "regional ileitis" or "terminal ileitis" was therefore replaced by "regional enteritis," "chronic cicatrizing enteritis," "localized hypertrophic enteritis," and "non-specific granuloma of the ileum and cecum." Nevertheless, the term "terminal ileitis" has been retained as an independent clinical disease picture, even though it is unlikely that the disease picture has a single cause.

It is very probable that an infectious, bacterial or toxic, origin underlies this disease, most likely of enterogenic character. It appears that several forms of primary virus may be the cause, although no special one can be designated. On the whole, the cause is still undetermined. Predisposing factors include constitutional factors and a reduced resistance to enterogenic infections.

Simple acute terminal ileitis rarely develops into the chronic form and it cannot be determined that the latter regularly has an acute initial stage. A common origin for both forms is induced by the peculiar functional conditions which prevail in the ileocecal region. The inflammatory changes develop most readily near the Bauhinian valve. The usual proximally arranged ulcerations, which in certain

cases of chronic terminal ileitis are found along the insertion of the mesentery are secondary and probably develop as a result of mechanical conditions associated with the perforation of the intestinal vessels through the intestinal wall.

The most important diagnostic aid is roentgenography. In the early stage it is possible to reveal changes in the terminal ileal mucosa. Subacute cases show a moderate narrowing of the bowel, some local stasis, rigidity of the bowel wall, and a mucosal relief pattern of the fingerprint-depression type resembling that of polyposis. The chronic type shows (1) a filling defect just proximal to the cecum, (2) abnormality in contour of the last filled loop of ileum, (3) dilatation of ileal loops just proximal to the lesion, and (4) a "string sign" of the actual lesion. There are also spastic contraction in the cecum and adjacent colon. The "string sign" is not pathognomonic for ileitis, as it also appears in other stenosing processes, such as tuberculosis, lues, actinomycosis, and sarcoma.

The differential diagnosis includes appendicitis, ulcerous colitis, and ileocecal tuberculosis.

The surgical treatment of simple terminal ileitis is dictated by the difficulties of the differential diagnosis from acute appendicitis, and exploratory laparotomy is advisable on the slightest doubt. If perforation threatens, resection or the Mikulicz procedure is indicated. With thickening of the mesentery, ulcerations with a tendency to perforation and abscess and fistula formation should be suspected. Resection is then indicated. In less severe cases roentgenotherapy has given good results. Opinions differ as to the value of enterostomy in chronic terminal ileitis. An abscess should be incised and drained, the normal procedure being the three-stage operation of drainage, ileocolostomy, and, finally, resection. Simple closure of the fistula is ineffective. The late results with sufficiently wide resection in healthy tissue are good.

LOUIS NEUWELT, M D

Crohn, B. B., and Berg, A. A.: Right-Sided (Regional) Colitis. *J Am M Ass*, 1938, 110: 32.

Right-sided (regional) colitis, as opposed to left-sided or universal colitis, is a disease that has its origin somewhere in the colon on the right side. It constitutes about 10 per cent of the cases of colitis, is progressive, somewhat less severe, and shows fewer spontaneous cures than the left-sided type. The disease, which may begin in any part of the colon on the right side, tends to spread upward and downward, and is retarded for various periods at the hepatic, splenic, and sigmoid flexures (Fig. 3).

Medical treatment in the hands of the authors has been disappointing and they believe that operation is indicated in all intractable cases. Since the operation that is utilized depends entirely upon an anastomosis with a healthy sigmoid, it becomes absolutely imperative to intervene surgically whenever the lesion shows a tendency to invade the pelvic colon, this segment makes surgery possible.

trolled by an exposure through the stomach and on other occasions has successfully performed a gastric resection even though it proved complicated.

The author concludes that the problem of bleeding peptic ulcer is certainly not one of surgery versus medicine although without doubt there is a group of cases which operation alone can save. He believes that the surgeon should not be excluded from the consultation until operation is decided upon as the last desperate measure. Indiscriminate operation cannot be too strongly condemned. Every case must be regarded as a special problem deserving of the most careful attention and it is important to remember the critical third day. The first forty-eight hours is the optimum period for surgical attack in the bleeding of chronic peptic ulcer.

SAMUEL J. FOGELSON M.D.

Falkin R. Intestinal Knots (Fingiges zur Kenntnis der Darmknoten) *Acta chirurg Scand* 1937 80:1

For a knot to form between two coils of intestine it is absolutely necessary for them to cross and for one coil to wind itself screwlike about the other in such a way that it passes through the opening partly surrounded by the crossing coils. If one coil winds around the other from the base to the tip it does not form a true knot but a twist. Intestinal knots are classified according to the parts of the intestine involved: (1) knots of colon and ileum, (2) knots of the two parts of the colon, and (3) knots of the ileal coils.

Falkin divided the knots between the flexure and ileum into two groups. The two groups differ in the fact that in one the ileum winds over the flexure in the primary crossing, while in the second group it winds under the flexure. Over and under designate cephalad and caudad respectively. In the first case a right screw results and in the second case a left screw. Figure 1 shows why expressions such as anterior and posterior and also ventral and dorsal are wrong in the characterization

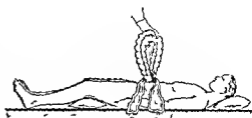


Fig 4

of the reciprocal position of the intestines in the primary crossing and that only by the words over and under does the characteristic reciprocal position remain unchanged even after the reflection of the intestines outside of the abdominal cavity. Figure 4 shows how by vertical sagittal elevation of the sigmoid flexure and observation of the type of the crossing with the ileum the group type can be determined in a simple manner before loosening of the knot. Figures 2 and 3 show the difference between a right and a left turn and how these two turns can be corrected by supination of the corresponding hand. If a pronating movement of the right hand is necessary to detorsion of a turn it is a case of left turn.

A knot formation in a single ileal coil is theoretically possible but its occurrence has not been demonstrated.

LOUIS NAWALIS M.D.

Strombeck J. P. Terminal Ileitis (Ileitis Terminalis) *Acta chirurg Scand* 1937 80: Supp 50

Regional ileitis appears mostly in young persons and is characterized by its localization in the lowermost 5 or 10 cm and exceptionally in the lowermost 30 or 60 cm of the ileum. The most marked changes occur next to the ileocecal valve, which marks the distal involvement. In the early stage the involved intestine shows hyperemia and edema occasionally.

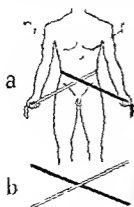


Fig 1

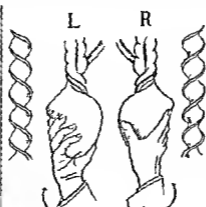


Fig 2

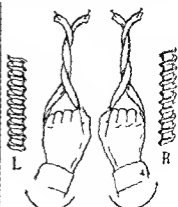


Fig 3

cases an artificial fistula in the small intestine or an artificial anus in the colon is made, then a second operation is done for the cancer. The safeguard of a fistula must also be resorted to when the intestine empties incompletely or when the condition of the patient necessitates small operative procedures. In uncomplicated readily movable tumors in accessible situations it is advisable, in general, to do a one-stage operation in which the side-to-side or the end-to-side anastomosis is used to unite the bowels. In the multiple-stage operation the exteriorisation of the diseased bowel is practiced.

In the treatment of inoperable cancer of the colon entero-anastomosis and artificial anus are of service. The anastomosis is more pleasant for the patient, serves the same purpose as the artificial anus, and is to be preferred, whenever it is technically possible. Nordmann also recommends that the lowest end of the small intestine be implanted caudal to the tumor in order to give complete rest to the cancer area and inhibit its growth. Radiation therapy is discouraged by all authors. It is not only useless and expensive, but it even induces a rapid decline. Schmieden goes so far as to state that roentgen irradiation of alveolar adenocarcinoma, which is refractory to irradiation, is malpractice, if through this cause the correct time for operation is missed.

(HENNINGSEN) JACOB E. KLEIN, M.D.

Finsterer, H: The Clinical Aspects and Therapy of Carcinoma of the Large Bowel (Zur Klinik und Therapie des Dickdarmkrebses) Wien klin Wchschr, 1937, 2, 1019, 1059

The author is able to confirm the assertion made by Mickulicz, that carcinoma of the large bowel is relatively benign. For this reason an effort to further reduce the operative mortality is completely justified. Two hundred and twenty-six cases operated on by the author himself were studied for their results. The desire for early operation was not fulfilled, 24.8 per cent of the patients had already developed acute intestinal obstruction, and the remainder had had complaints on the average of about ten months' duration. For the early recognition of the condition the most important thing is to think of the possibility of carcinoma and not to allow oneself to be steered into false conclusions by isolated symptoms of the disease that may make their appearance at the beginning. One of these symptoms is the painful inflation of the cecum and ascending colon, which even in carcinoma of the left half of the large intestine not infrequently may lead to a mistaken diagnosis of appendicitis. The appearance of chronic constipation should be suspected as a sign of carcinoma in every person over forty years of age. Also the colic-like pains which in many instances are most predominant in the right half of the abdomen do not always signify appendicitis. A palpable tumor is to be regarded as a late finding. As soon as the suspicion of a carcinoma arises the practitioner must make the diagnosis certain by all the clinical methods of examination which are at his disposal. In addition to rectosigmoidos-

copy and the barium enema including the film of the emptied bowel, the contrast meal is also indicated. One must guard against the misdiagnosis of "spasm." The latter is present only if the constriction in question disappears upon the administration of atropine. A negative x-ray finding should not quiet all suspicion. If the diagnosis still remains uncertain then an exploratory laparotomy is indicated.

The contra-indications for radical operation should not be carried too far. The extension of the carcinoma to the small intestine or its mesentery should not without further complications be a contra-indication to radical operation. Furthermore, there is only a slightly higher operative mortality in patients over sixty years. In view of these considerations the author sets the operability in his cases as wide as 79 per cent.

The operative procedures were divided as follows: 179 (79.2 per cent) were resections, 30 (13.2 per cent) colostomies, and 17 (7.5 per cent) entero-anastomoses. The immediate mortality following operation depends primarily upon the condition of the patient. The highest mortality, 30.2 per cent, occurred in the cases presenting acute intestinal obstruction which could be treated only by cecostomy at first. Since this procedure was carried out primarily under local anesthesia, the very low mortality of 8.3 per cent explains itself. The intestinal resection which was performed after complete emptying of the bowel was later modified with a closing of the ventral anus, so that a three-stage resection was evolved which yielded a mortality of 13 per cent. It is only in intestinal obstruction caused by carcinoma of the right half of the large intestines that the typical marsupialization of the carcinoma is recommended. If there is no acute obstruction then it is possible to carry out, other circumstances permitting, a one-stage operation in carcinoma on the right side, but in carcinoma on the left side it is practically always necessary to perform the two-stage resection, in which the side-to-side anastomosis is almost exclusively employed. The one-stage resection gave a mortality of 15.3 per cent, the two-stage resection gave a mortality of 26 per cent in carcinoma of the right half of the large bowel, and a mortality of 30 per cent in carcinoma involving the left portion of the large bowel.

In stenosing carcinoma the three-stage resection, giving a mortality of 23.3 per cent, is the method of choice. In this respect only 3 of the 7 deaths were directly related to the method of operation used. The entire series of three-stage resections in cases with and without intestinal obstruction showed a total mortality of 18.8 per cent. In general the local anesthesia was of the most significance in explaining this result, as it prevents intestinal atony and pulmonary complications, permits older individuals to be subjected to operation, and allows more time for the performance of the operation. General anesthesia makes rapid operation necessary and thus tends to limit the extent of the procedure. The evaluation of the end-results is based upon 96 cases operated upon.

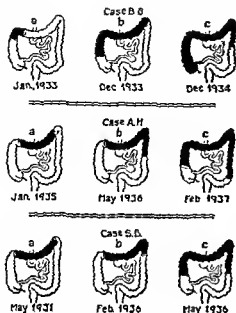


Fig. 1. Spread of the lesion. Progressive course or life history of regional colitis (diagrammatic).

The operative procedure is divided into two or three stages. In the first stage healthy ileum is anastomosed to the sigmoid. The sigmoid is divided in a healthy area and its distal end is turned in. The diseased proximal segment is brought out at the upper end of the operative wound as a colostomy. This permits the fecal stream to be sidetracked through entirely normal tissue and the infected contents of the involved colon to be discharged out of the body. Following a period during which the patient is permitted to build up his strength, a second operation is done at which time the diseased

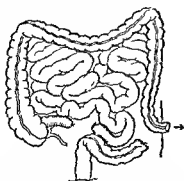


Fig. 2. Implantation of proximal end of ileum into the lower sigmoid. Complete division of two upper ends of sigmoid. Closure of the distal end of sigmoid. Establishment of artificial anus in proximal end of sigmoid.

colon is removed entirely. Occasionally the latter operation has to be done in two stages (Fig. 4).

As performed, the operation offers these advantages: (1) there is absence of shock; (2) the suture lines are guarded against infection since the infected contents are discharged outside; (3) extirpation of the colon is made possible even in debilitated individuals; and (4) the continuity of the alimentary tract is maintained without a permanent stoma in the nature either of an ileostomy or of a colostomy.

JOHN WILFRIED EPPICH, M.D.

A Discussion of the Diagnosis and Treatment of Cancer of the Colon (Umsicht über die Diagnose und Behandlung des Dickdarmkrebses) *Med. Klin.*, 1935, 1: 457-463, 500

As Petermann indicated in his introductory remarks the purpose of this discussion was to improve the results of operation for cancer of the colon by clarifying certain essential matters. These concern: (1) the early symptoms; (2) the value of roentgen examination for early diagnosis; (3) the particularities of surgical procedures; and (4) the management of inoperable carcinoma.

The first question was unanimously answered to the effect that definite early symptoms may not be apparent even to the intelligent and watchful patient if there is no bowel constriction or bleeding (Stich). Discomfort in the abdomen and temporary constipation in patients over forty years of age should arouse suspicion of cancer (Fischer). If the tools are altered at a certain definite period if diarrhea occurs or if distention and colic occur after certain foods, one should not be satisfied with the diagnosis of spasm but should look for cancer (No. 1). Local abdominal distention and occult blood are frequently found in the stool (Wildegans). On the other hand, the sedimentation rate of the red blood corpuscles is no indication as concerns cancer (Stegemann).

Röntgenology of the large bowel has progressed so that we can recognize malignancy very early (Hirschner) especially when we use three procedures: contrast enemas, full distention of the colon, study of the relief of the contracted colon, and study of the connecting intestine distended with air (Fischer). The roentgen examination should go hand in hand with the clinical investigation and in doubtful cases should be repeated after a while. In spite of all advances in diagnosis, exploratory laparotomy should not be neglected although its use is progressively becoming restricted (Schmieden).

As concerns the type of operative intervention all experienced surgeons are agreed. Each individual case requires exact study, care and consideration as concerns the strength of the patient, the advisability of the basic radical operation always being kept in mind. Should there be ileus, we should remember that in such a case there are two ailments present: (1) ileus; (2) cancer. The latter condition cannot be attacked until the former has been cured (Schmieden). According to the situation of the cancer in these

cases an artificial fistula in the small intestine or an artificial anus in the colon is made, then a second operation is done for the cancer. The safeguard of a fistula must also be resorted to when the intestine empties incompletely or when the condition of the patient necessitates small operative procedures. In uncomplicated readily movable tumors in accessible situations it is advisable, in general, to do a one-stage operation in which the side-to-side or the end-to-side anastomosis is used to unite the bowels. In the multiple-stage operation the exteriorisation of the diseased bowel is practiced.

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at least five years previously and in which the diagnosis was substantiated histologically. Of all of the patients in whom resection was done 43.7 per cent, or 57.8 per cent of those discharged as cured remained free from recurrence for more than five years. Fifty-one and three tenths per cent of the patients with carcinoma on the right side and 38.9 per cent of those with carcinoma on the left side were cured (Daveco). HARRY A. SUTZMAN, M.D.

Wangenstein O H, Buirge R E, Dennis C, and Ritchie W P. The Etiology of Acute Appendicitis. *Ann Surg* 1937 106 910

The observations made during the nineteenth century stressed mechanical disturbances as the cause of inflammation of the vermiform appendix. Convincing evidence, however, was lacking to establish mechanical disturbances as the chief cause of appendiceal suppurations. Speculation and arm chair philosophizing have given us many different theories relative to the origin of this disease and complete sight was lost of the pathological observations of our medical ancestors. The vigorous declarations of Aschoff who believes that acute suppurative appendicitis is essentially a specific disease due to the enterococcus Type B (Gundel) have won many converts to the view that appendicitis is infectious in origin. However many observations relative to the importance of the obstructive factor cannot be lightly dismissed or set aside.

The present study was undertaken with the purpose of investigating the minute anatomy of the vermiform appendix of man to determine whether the obstructive features of acute suppurative appendicitis found an accordant explanation in the behavior of this appendage. An attempt was also made to evaluate the likely significance of the factors of infection and obstruction. It has been pointed out that in the severe forms of the disease in man perforative and gangrenous appendicitis a demonstrable obstruction often a fecalith was usually present.

Evidence of fluid secretion by the vermiform appendix was obtained. The nature of this secretion still remains obscure. Its amount in the normal appendix is from 1 to 2 c.c. daily. The luminal capacity of the vermiform appendix was found to be very small and it is intimately related to the problem of fluid secretion under conditions of obstruction of the lumen.

The vermiform appendix of man serves no known useful function. It apparently possesses the function of secreting a minimal amount of fluid. Because of this function of secretion the appendix becomes a dangerous organ when obstructed. The minute anatomy of the vermiform appendix as it relates to the problem of acute appendicitis has been studied extensively. The resistance to luminal outflow which the appendix exhibits is in all likelihood a result of its small luminal capacity and strong sphincter like circular muscle. No evidence of a true cecal appendicular sphincter has been found.

The effect of obstruction of the cecal appendix has been studied in many animals. Only in the rabbit's appendix has a secretory function been observed comparable to that shown in the vermiform appendix of man. JOHN H. AUSTON, M.D.

Nassau C F. Treatment of the Ruptured Appendix. *Surg Clin North Am* 1937 17 1743

Appendicitis constitutes the most common infective lesion within the abdomen and naturally demands first consideration in diagnosis. In the fulminating types perforation may occur within six hours of the onset of symptoms. It is well known that the mortality of this disease is not decreasing in the United States. This is the result of the physician's failure to make an early diagnosis or his being called too late. It is an incontrovertible fact that those patients who are taking a cathartic or who have had one prescribed for them are the ones in whom perforation occurs more rapidly and frequently with fatal results. A perforation occurring naturally is always a far better operative risk than one in which the bowel contents are in a fluid state and where active peristalsis exists as the result of purgation.

While it is generally agreed that all early cases demand immediate operation, controversy still exists as to whether immediate operation should be performed in the patients with perforation of several days standing or whether the Ochsner or Evans therapy should be carried out. There is a small group of patients in whom delay in operation is the wiser and safer course of procedure. In these the Ochsner treatment effects localization of the infection and the abscess can be safely drained at a later date. In a recent survey in one hospital localization occurred in the pelvis under this treatment in 18 cases. Incision and drainage by the rectum resulted in 17 recoveries and 1 death.

The McBurney incision is preferred by the writer because the muscles are split in the direction of the fibers; there need be no division of the nerve supply; there is less exposure of the intestines; exposure is frequently directly over the appendix; the deep epigastric vessels are rarely encountered; drainage is lateral to the small bowel; and the incidence of post-operative hernia is much lessened. From an anatomical standpoint the McBurney incision has much to recommend it.

At operation the appendix should always be removed if possible and if it is safe to do so. When the appendix forms part of the abscess wall it must be accurately determined whether it can be safely removed without breaking into the clean peritoneal cavity. Few operations demand more skill and judgment than the removal of a violently infected adherent appendix. If there is much infection simple ligation of the base of the appendix will suffice. The use of the cautery or carbolic acid is not vital. Purse-string or other occluding sutures are unnecessary. In a thickened and inflamed cecum they may be harmful and cause sloughing. The wound is to be

left completely open in all badly infected cases, no sutures whatever being used

The most important factor about drainage is the accurate placing of the drains. The dressed drainage tube should be introduced first by sliding it on the end of a long forceps along the pelvic wall to the bottom of the pelvis. The cecum can usually be placed so that the appendix stump rests against the lateral wall, removed from actual contact with the drains. The dressed drains consist of gauze rolled in a Penrose rubber tubing. After the Penrose drainage has been placed, plain or iodoform gauze is used to keep the wound open and the tube in place. Since the wound is not sutured, this is the only method known to keep the bowel from eviscerating and at the same time allow free drainage.

Postoperative treatment consists of the administration of morphine in sufficient amounts to keep the patient comfortable. Liquids by mouth are withheld until the tone of the bowel is restored. Wangenstein syphon drainage is employed for gastric distention. The patient should receive an average of from 2,500 to 3,000 cc of fluid daily if there is no abnormal loss of chlorides and fluids from vomiting. The amount of chlorides required to maintain the electrolyte balance can be accurately gauged by estimation of the blood chlorides and the alkali reserve, from 5 to 6 gm. being necessary each day. Continuous intravenous infusion with 2 per cent glucose in normal salt solution is the preferred method. Introduced slowly, it will not overburden even the damaged heart. When hypodermoclysis is employed, it should not be given in the thighs. It is a needlessly painful procedure as there is no room for the fluid because of the lack of loose cellular tissue in the thighs. It should be given under the axillæ or at a point about 6 in. below in the midline where absorption is rapid. In septic patients, small transfusions of whole blood are most valuable. The dressed drain is completely removed on the fifth or sixth postoperative day and is immediately replaced by a gauze wick. The patient is allowed to be up when the drainage wound is reduced to the size of a small lead pencil.

JOHN W. NUZUM, M.D.

Keyes, E. L.: Squamous-Cell Carcinoma of the Lower Rectum. *Ann Surg*, 1937, 106: 1046

The author gives a detailed account of 27 proved cases of squamous-cell carcinoma of the lower rectum and anus. A series of adenocarcinomas was also observed in detail for the sake of comparative study. From his observations the author arrived at some very interesting conclusions.

Squamous-cell carcinoma of the lower rectum and anus is not rare. It occurs more frequently among females than among males. Some factor preponderant in the female sex seems to be responsible for the condition.

A chronic irritant factor in most cases is concomitant with the origin of the carcinoma. This local irritation was observed in various forms. Hemorrhoids or condylomas were present in 7 in-

stances, anal fistula or abscess was noted in 5, leucorrhea in 3, and unusual trauma to the anus in 2 cases. In 1 case the condition developed in an area of perianal leucoplakia seven years after operative treatment and the apparent cure of a vulvar carcinoma. Another case of anal carcinoma arose in a perianal scar resulting from the treatment of a vulvar carcinoma which had apparently been cured four years previously by means of radium application. The author observes that areas of leucoplakia about the anus are to be regarded with suspicion, if not removed. Moreover, radiation of the perineum must always be administered with care lest it predispose to carcinoma of the anus. So important is this matter of local irritation that the disease may sometimes prove to be preventable. Thus adequate treatment of anal disease and of certain cervical or vaginal diseases may remove a chronic irritant factor, which, if allowed to continue, might serve as a predisposing cause to a carcinoma in the anus.

Pain seems to be an early and frequent symptom of the disease. The carcinoma itself is probably not directly responsible for the pain, but possibly fissure of the anal mucosa or an associated infection may be the cause. Other early symptoms are pruritus and bleeding. Some patients feel an unusual mass in the anus. Pus and pain on defecation are likewise fairly common. Occasionally a change in bowel habit is noted, with either constipation or diarrhea or with both alternating. Sometimes ribbon or pencil stools are passed, and again other stools contain blood or pus. In the later stages the frequency or urgency of urination is noted. Other symptoms are incontinence of feces, perirectal abscess, and anal fistula. Some patients lose weight, while others may note a mass in the groin. This symptomatology is, however, not characteristic of the squamous-cell type of carcinoma only. Similar symptoms were noted in the cases of adenocarcinoma of the anus.

As to physical characteristics, all the carcinomas in the author's series were readily accessible by palpation. Some of them were visible from the outside. A number of them were externally located while others were situated internally, some of them ran high into the rectum, the highest tumor being about 8 cm. above the anal orifice. Only one tumor was annular. In this respect squamous-cell carcinoma did not resemble adenocarcinoma, which frequently encircles the anal canal in annular fashion. The characteristic appearance of carcinoma was rarely lacking upon inspection or palpation of any of the tumors. In most cases biopsy was employed to confirm the diagnosis. Without it, adenocarcinoma could not be ruled out.

A study of the character of the metastatic spread of squamous-cell carcinoma of the lower rectum and anus brought out the significant fact that the general direction of metastatic extension was downward and lateral, but not upward. This was in contrast to the general direction of metastatic extension of adenocarcinoma, which was upward rather than downward and lateral. This circumstance has an

important bearing upon the operative treatment of squamous cell carcinoma. The theory that metastases from squamous cell carcinoma of the lower rectum and anus are usually rather well circumscribed and rarely distant has not previously been clearly set forth. The failure of squamous cell carcinoma of the lower rectum and anus to invade the upward zone of Miles would make less radical excision possible.

With regard to treatment of the primary tumor in the case of squamous cell carcinoma a choice between surgery and irradiation is possible since some of the primary tumors of this type are radiosensitive. Tumors of the adenocarcinoma type are known to be radioresistant.

Regarding operation the author advances certain principles as a result of his study. He deems it essential that the primary tumor be widely excised with removal of the sphincter and radical excision of the anus and rectum. In addition a maximum of the tissues in the downward and lateral zones of Miles should be removed. This would include a wide amount of perianal skin, the sphincter ani muscles, the ischioanal fat together with the coccygeal and levator ani muscles, and the pelvic fascia and pelvic peritoneum laterally to the pelvic walls. As to upward dissection the optimal height for amputation of the rectum would seem to be a moderate distance above the reflection of the peritoneum upon the rectum. A bilateral dissection of the inguinal and femoral lymph nodes seems absolutely justifiable in every case of squamous cell carcinoma of the lower rectum and anus principally as a prophylactic measure. It is true that squamous cell carcinoma is not likely to metastasize to the groin in every case, however when it does it almost always proves fatal.

JAMES J. SEELIGER, M.D.

Thorgersen E. On Fistula Ani and Its Treatment Taking into Consideration Fistula Ischio-Rectalis in Particular. *Acta Chirurg Scand* 1937 80 113.

The correct treatment of fistula ani demands an accurate diagnosis of the fistula. An intimate knowledge of the course, extension, cause and pathogenesis of the fistula is required. The most important symptom is secretion and the pus is usually thin and liquid in the chronic stage. The patient may have pain followed by a copious discharge of thick pus. The discharge may disappear and the external orifice close for a time. In complete fistula fecal material and flatus may pass through the tract. From a diagnostic angle it is most important to decide whether the fistula is complete or incomplete and whether it is intrasphincteral or extrasphincteral in location. As regards the causes of fistula ani chronic constipation occupies first place. The fistula always develops from an anal abscess. There is a marked tendency toward a chronic course due to the constant reinfection from the bowel. Tuberculosis is also responsible for a certain number of fistulas of the rectum.

The treatment of ischioanal fistula is carefully discussed. It is evident that both division and excision after division are dangerous, the anal sphincter often becoming incontinent even though the method are modified in various ways to offset this danger. Operations which aim at closure of the external fistulous opening to make it proof against infection and in which the fistula is more or less excised are not very practicable. The writer believes the most efficacious treatment is that in which the mucous membrane of the rectum is stitched down into the anal ring so that the internal fistulous opening is covered by healthy mucous membrane. Widoer's modification which leaves the fistulous tract untouched, is particularly applicable. The writer has records of 18 cases of fistula operated upon according to the Widoer method and which upon reexamination showed that all of the 18 patients were permanently cured. The Widoer method is recommended highly.

JOSEPH W. WIDOR, M.D.

LIVER GALL BLADDER PANCREAS AND SPLEEN

Hugelins C. and Post J. Experimental Subtotal Ligation of the Arteries Supplying the Liver. *Arch Surg* 1937 35 875.

The authors report the results of two series of experiments showing the difference between acute ligation of the main arterial supply of the liver and subtotal ligation of the hepatic arterial supply in multiple stages. In these experiments they followed the postulates of Haberer: (1) the point of ligation shall be accurately stated; (2) the experiment shall be terminated by the injection of the arteries to establish the collateral circulation; and (3) the operation shall be done under aseptic technique.

In 9 dogs the hepatic artery and its principal collaterals, the right gastric and the gastroduodenal arteries, were sectioned between ligatures. All of the dogs died of peritonitis and in nearly all of them bloody fluid was found in the peritoneal and pleural cavities in association with the liver necrosis. In a second series of dogs the hepatic artery was ligated proximal to its communication to the gastroduodenal artery. After a period of from one to four weeks the gastroduodenal and the right gastric arteries were ligated and the hepatic artery was dissected and excised and its branches were ligated where they entered the liver. About 2 cm. of the cystic artery were removed with the entire hepatic artery and 2 cm. of each of its branches to the liver. In 3 dogs the peritoneal attachments of the liver to the diaphragm, esophagus, stomach and posterior abdominal wall as well as the adventitia of the hepatic veins were removed at the third stage and in 2 of these the phrenic arteries were also ligated. None of the dogs in the second series died, however acute cholecystitis occurred in all.

The authors believe that it is impossible to completely deprive the liver of its entire arterial supply in this manner as fine arterioles are demonstrable

by injection following up the portal vein and common bile duct. Apparently, if the arterial circulation of the liver is gradually reduced, death from anaerobic bacteria does not occur, and the liver becomes accommodated to the deprivation of most of its arterial supply.

WILLIAM C BECK, M D

Garlock, J. H., and Klein, S. H. • The So-Called Hepatorenal Syndrome. *Ann Surg*, 1938, 107 82

The authors discuss the various clinical and pathological aspects of the so-called hepatorenal syndrome occurring after operations upon the gall bladder and biliary ducts, as reported in the literature. Many of the reports were found to be wanting in post-mortem studies. Those that include necropsy examinations present a curious lack of uniformity of the pathological picture, which raises the question of why one case presents minimal findings at autopsy, while another with the identical clinical picture may exhibit extensive hepatic and renal degenerative changes.

A possible explanation for this considerable variation in degree and extent of the pathological findings is suggested. It seems possible that many of the patients have some degree of kidney damage before the surgical attack on the biliary system, with a small margin of safety from the standpoint of renal reserve. This impairment may not be apparent or demonstrable by any known laboratory methods. Following the operation upon the diseased biliary tract, with its associated surgical trauma and the greatly altered physiology that must necessarily follow, the already impaired kidneys are unable to cope with the additional load thrown upon them and soon break down completely. The clinical picture, with the relatively free interval of five to ten days after operation, suggests confirmation of this thought.

A case is reported in detail in which, five days after operation for a calculus gall bladder and bile-duct disease, there followed a clinical course characterized by progressive asthenia and uremia with terminal icterus. Death occurred on the thirteenth postoperative day. The post-mortem findings, in contrast to the severe liver and kidney changes reported in the literature, consisted only of mild parenchymatous degeneration in these organs, and acute and chronic cholangitis. These changes certainly could not be held responsible for the clinical course of the patient. The kidneys, however, showed some focal interstitial inflammation, manifested by nests of lymphocytes, plasma cells, and infrequent polymorphonuclear leucocytes within the stroma of the medulla. In addition, there was a striking glomerular lesion. This consisted of an increase in the size of the glomeruli, which was due to prominence of the intercapillary connective-tissue framework which appeared spongy, as if distended by fluid. There was no increase in the cellularity of the malpighian corpuscles. This glomerular picture bore a strong resemblance to the acute intercapillary glomerulonephritis described by MacCallum and

considered by him to constitute the initial stage of the chronic condition known as glomerulonephritis.

In conclusion, the authors have formed the opinion that no logical or satisfactory explanation of the so-called hepatorenal syndrome has as yet been offered. Although many authors believe it to follow surgery of the biliary tract only, the same syndrome has been known to follow operations upon the gastro-intestinal tract and also extensive cutaneous burns, conditions known to be closely linked with disturbances of the protein metabolism.

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Livraga believes that during the autolytic disintegration of tissues there are formed substances which are capable of producing grave symptoms in the organism and even death. Examples of this phenomenon are furnished by the symptoms which follow extensive burns, severe surgical traumatism (a condition generally called "shock"), and unilateral ligation of the ureter due to the formation of nephrotoxins which escape into the circulation.

Fiessinger and his collaborators used hepatic autolysates and extracts which, when injected into animals, produced anatomical and functional alterations of the liver and also some slight changes in the kidneys. It has been also reported that the most potent preparations of this kind were those which had been kept in the thermostat under toluene for a period of from eighteen to forty-four hours. The maximum effect was obtained with autolysates thirty-six hours old at a pH ranging between 7.65 and 8.30.

Histological examination of the liver revealed a diminished glycogenolytic action of the cells and the presence of degenerative changes throughout the organ. Similar histological findings have been found in analogous experiments performed with renal autolysates.

Livraga studied this problem in dogs by removing small portions of liver tissue and transplanting them into the abdominal cavity, where they underwent autolysis. In his experiments the author used exclusively dogs which were in excellent physical condition. A portion of the liver was removed and small pieces of the removed tissue were secured for microscopic examination, for the determination of the iodine number, and for bacteriological examination. All the dogs were examined after death and all showed a serous peritonitis characterized by the presence of variable quantities of fluid within the abdominal cavity, and a few fibrinous strings.

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JOHN W. ALLEN, M.D.

LIVER, GALL BLADDER PANCREAS AND SPLEEN

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Macroscopically, the liver was intensely congested and 1 dog showed an exudative pleurisy in the left thorax.

The histological findings of the liver and kidney included a marked hyperemia with extensive and diffuse intraparenchymal hemorrhages, venous congestion edema, and small cell infiltration of the vascular adventitia.

Further changes included cloudy swelling and vacuolar degeneration of the cells.

In the kidney there was a diffuse hyperemia involving especially the arcuate vessels, the glomeruli and the capillaries of the medullary zone. A few intratubular hemorrhages were observed.

All the animals died within from twenty-four to forty-eight hours as the result of the morbid changes produced by the pieces of liver tissue transplanted into the peritoneal cavity which were undergoing autolysis. The weight of these implants ranged from 30 to 40 gm. If the weight of the transplanted tissue was reduced to 10 gm. the animal survived from three to four days and the liver showed changes typical of an acute yellow atrophy.

The author concludes by stating that pieces of liver tissue transplanted into the abdomen undergo rapid and massive autolysis. During this process highly toxic substances are liberated which when absorbed produce vascular lesions and necrotic degenerative changes in the liver similar to those of acute yellow atrophy.

The hepatic condition is usually associated with a renal condition which may be so severe as to cause death of the animal.

Clinically this is of considerable importance because in surgical patients presenting an obstruction of the biliary tract it is more advisable to remove seriously damaged portions of the liver tissue rather than to proceed conservatively.

REKARD L. SOMMA, M.D.

Bettman R. B. and Lichtenstein G. End Results Following Cholecystectomy. *Am. J. S. Sc.* 1937 104: 784.

The authors present an analysis of the results following cholecystectomy performed upon 239 patients on the charity service at Michael Reese Hospital. Despite careful pre-operative study and judicious selection of the cases they found that a

disappointingly large group of patients have had little or no relief from the symptoms for which the operation was performed.

Of the 239 patients 208 were females and 31 were males. About 63 per cent of them were between thirty-one and fifty years of age. Epigastric and right upper quadrant pain was the most common symptom in both the calculous and non calculous types of disturbance. Nausea, vomiting, belching, food indigestion and bloating occurred in the order given. There was a history of jaundice in 27 per cent of the patients in both those with and without stone. The possibility of stones having passed into the duodenum at some time previous to operation was suggested. A cholecystostomy had been performed upon 17 of the patients.

Some type of operation on the common duct was carried out in 33 cases. The mortality in the series was 4.2 per cent. The mortality in those cases in which an exploration of the common duct had been made was 12.1 per cent while simple cholecystectomy carried a mortality of 2.9 per cent.

The authors classify their results in 184 patients who had been followed up from one to six years according to (1) symptomatic cure, (2) symptomatic relief and (3) no relief. From a pathological standpoint the cases have been divided into five groups as follows:

1. Those with no demonstrable gross or microscopic lesions of the gall bladder.

Those preventing fibrosis.

3. Cases of chronic cholecystitis.

4. Cases of marked chronic cholecystitis.

5. Cases of acute cholecystitis.

It was observed that the percentage of good results increased with the severity of the lesions encountered in the gall bladder and in general the shorter the duration of the symptoms the greater the benefit. The poorest results were encountered in the age groups from eleven to twenty and from fifty-one to seventy. A follow-up study was made of 119 patients who had stones. 82 per cent were cured or benefited by the operation. Of the 58 patients without stones only 67 per cent were benefited.

JOHN A. GIES, M.D.

GYNECOLOGY

UTERUS

Lipschuetz, A. Experimental Hyperplasia of the Endometrium with Atypical Proliferation of the Uterine Mucosa following Ovarian Interventions (Hyperplasie expérimentale de l'endomètre avec prolifération atypique de l'épithèle utérin après des interventions ovariennes) *Gynéc et obst*, 1937, 36 408

Lipschuetz states that the female sexual cycle depends primarily upon adequate follicular function in the ovary. The cycle is a complex one and other organs also, such as the anterior lobe of the pituitary gland and the central nervous system, participate in its mechanism. The placenta and the breasts exert a contributory influence during pregnancy and the puerperium.

The author is primarily interested in the reactions ensuing from the removal of one ovary and subtotal resection of the other one. He found that following this operation, the surviving ovarian fragment undergoes hypertrophy and the number of graafian follicles steadily decreases until the entire supply is used up. He believes that an extragonadal factor "X" exists, which factor regulates and controls follicular development quantitatively as well as chronologically. This suggestion has been offered also by other investigators.

Lipschuetz has found also that following the aforementioned operation, the growing follicles become cystic and, in the cat and guinea pig, the tissue surrounding the cystic follicle becomes luteinized. This is sometimes associated with an intra-follicular hemorrhage. According to the author these changes are due primarily to disturbances in the relationship between the anterior lobe of the pituitary gland and the ovary, arising as the result of the ovarian intervention.

Other disturbances are also observed. In the rat the keratinization of the vaginal epithelium, characteristic for estrus, persists for several weeks and months. The introitus of the vagina gradually opens and the vagina itself is filled with a grayish and viscous secretion. The mammary gland becomes hypertrophied as in the last days of pregnancy. Colostrum may be expressed in some cases.

The most drastic changes, however, are observed in the uterus. The microscopic picture of the uterine mucosa corresponds to that seen in glandular cystic hyperplasia in the human female.

The proliferation of the uterine glands is remarkable. The entire mucosa is filled with glandular cavities of various diameters. Some of them are veritable cysts. The endometrium is usually hypertrophied and the large cysts are filled with desquamated cellular elements and many leucocytes. The layer in which the uterine glands proliferate is greatly thickened and edematous, and presents many dilated blood vessels, some of which are rup-

tured. Extravasations are common. The uterine cavity is almost always dilated and may contain some leucocytes and red blood cells.

The microscopic picture is typically that of a cystic hyperplasia of the endometrium due to the persistence of graafian follicles in the ovarian fragment. It has been shown experimentally that cystic glandular changes of the endometrium may be produced by the administration of estrone, which is normally elaborated by the growing graafian follicle and which stimulates the growth of the endometrium.

The author concludes that the endometrial changes in animals with an ovarian fragment are due primarily to a prolonged follicular phase of the ovarian cycle.

RICHARD E. SOMMA, M.D.

Lehmann, P., and Marquès, P. Treatment of Cancer of the Cervix by Radiotherapy, X-ray, Radium, and Electrocoagulation (Traitement du cancer du col par la radiothérapie, rayons X et radium et l'électrocoagulation) *Rev franç de gynéc et d'obst*, 1937, 32 763

In the treatment of cancer of the cervix, the utilization of physical agents previously reserved for inoperable cases is steadily becoming the treatment of choice.

The authors divide their treatise into a detailed discussion of the technique, the statistical results, and the therapeutic indications for x-ray, radium, and electrocoagulation.

The biological effect of radiation upon the cells varies with the dosage, massive doses produce coagulation by necrosis and the degree of this caustic action is dependent upon penetration and absorption. With smaller doses the effect varies from cytolysis, pycnosis, and caryorrhexis to abortion of cell division or temporary arrest of growth.

Cancer of the cervix is the most radiosensitive carcinoma of the body and its readily accessible location makes it particularly suitable for all types of radiation. In these carcinomas of the cervix the ultimate aim is to destroy the local lesion, and the intracavitary application of radium is the ideal method of treatment. For extension into the ganglia and metastases roentgenotherapy is indispensable.

The most important radiotherapeutic problem is to obtain maximum depth with one surface dose. It is the physical study of the distribution of these radiations which will aid in establishing a solution to this problem, and this distribution is dependent upon two factors: a divergence factor and an absorption factor. The factor of divergence is the geometrical consideration in irradiating a surface that the intensity varies inversely with the distance and in direct ratio with the cosine of the angle of incidence. The factor of absorption is regulated by means of diffusion or by fluorescence.

This physical study of the distribution of energy in the process of irradiation demonstrates that in order to get the maximum yield at a depth it is necessary to (a) utilize a short length filtered wave (b) augment the width of the irradiated area (c) increase the distance from the skin and (d) utilize crossed rays.

The technique for utilizing the curietherapy as practiced in France consists essentially of making one properly screened uterovaginal application the dose equalling 60 destroying millicuries. Before the radium is to be applied the patient is prepared by vaccino-therapy and disinfection of the vaginal canal by suitable antiseptics followed by dilatation of the cervix with Hegar dilators and if the patient remains afebrile for twenty-four hours the radium is placed *in situ* and proper tamponade effected. Each day the radium and tampon are removed the vagina is cleaned and the tampon reapplied. This procedure is continued for a total of from five to five and one-half days. Marked thermal reactions necessitate interruption of the irradiation.

Local roentgenotherapy by means of a specially constructed instrument which can be applied vaginally has recently been introduced but the authors believe that this method is not as effective as radium. Regional roentgenotherapy consists of irradiating through the skin all regions suspected of neoplastic invasion. The voltage should be high 200-000 the filtration should be sufficient to permit of a homogeneous application 2 mm of copper in France with a secondary filtration with aluminum the distance should be 80 cm from the anticathode to the skin.

One of three methods of treatment by means of the roentgen ray are commonly employed the successive series method consisting of small doses at from two and one-half to three month intervals the fractional series method extending over a period of thirty days beginning with from 100 to 125 roentgens and increasing daily or the rapid method with a large dose at one exposure. A fourth method known as total roentgenotherapy is employed in those cases in which the carcinoma is generalized. The dosage should be small from 25 to 50 roentgens in graduated doses not to exceed from 300 to 350 roentgens per any one series.

Electrocoagulation or diathermy coagulation produces destruction by coagulation and is not a elective action upon the cancer cell *per se*.

The diverse methods of treating cancer of the cervix can be combined and the combination of roentgenotherapy and curietherapy becomes the method of choice roentgenotherapy for the parametrium and curietherapy for intracavitary use.

The statistical results of the treatment of cancer of the cervix by radiation have improved considerably in the last fifteen years.

Histologically one encounters the following changes in the irradiated cells (a) destruction by pyknosis, then a rapid absorption (b) atypical karyes with new plurilobe formations and cells of large dimensions which degenerate rapidly and be-

come absorbed and (c) a state of amito is which is pronounced about the tumor. In the tumor proper there is (a) a destruction followed by a rapid absorption of the tumor cells (b) an evolution toward keratinization of the intermediate cells and (c) a capillary congestion with diapedesis and edema and appearance of the mobile cells of the adjoining tissues destined to liquefy the residues.

Anatomically the tumor diminishes then disappears in conjunction with the process of absorption.

In these studies the percentage of cures of cancer of the cervix from the diverse statistics is very encouraging. Radiation formerly reserved for those cases in which surgery was contra indicated is now becoming the method of choice in the treatment of carcinoma of the cervix. GEORGE C FINOLA M.D.

Novak, E. and Anderson D. F. Sarcoma of the Uterus. *Am J Obst & Gynec* 1937 34 749.

This study is based upon 59 cases of uterine sarcoma observed during a twenty-five year period in a total material of 26,972 case specimens an incidence of 0.22 per cent. The highest age incidence was noted in the fifth decade of life. The symptomatology is not distinctive and diagnosis is often difficult until operation and laboratory examination.

Sarcoma may arise from any of the constituent elements of the uterine wall or of uterine myoma but is commonly of myogenic origin. It is probable however that it cannot arise as was formerly believed from mature muscle fibers in spite of the apparent histological transitions often seen. As with sarcoma elsewhere its origin is almost certainly from unripe or undifferentiated muscle cell elements. The most common seat of origin is in myomas the incidence of such change in the authors series being 0.56 per cent and representing a fair estimate. The most serviceable grouping is along general pathological lines into round spindle mixed and perhaps giant cell types. The degree of mitotic activity is a good index of the degree of malignancy of these tumors.

The treatment is often a matter of expediency rather than deliberate planning especially as the disease is so often recognized only at or after operation. Surgery is therefore the basic method of treatment with radiotherapy as a valuable adjunct.

While uterine sarcoma is a serious disease the outlook is relatively good when the tumor arises in a myoma. The mural and endometrial varieties of tumor are more unfavorable.

A follow up study was possible of 50 patients. Of these only 15 (30 per cent) were known to be living at the end of five years and only 12 (24 per cent) at the end of ten years. EDWARD L. CORNELL M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Hamblen E. C. and Ross R. A. Responses of the Human Ovary to Gonadotropic Principles. *Endo rinology* 1937 21 722.

The authors feel that ovarian responses judged either by direct observations at laparotomy by

microscopic study, or by inferential studies of the endometrium were not different qualitatively or quantitatively in their series of patients receiving larger daily and larger total dosage from those in patients reported previously. No progestational reaction occurred after treatment in the endometria of the 6 patients with presumed anovulatory failure. Such observations have been taken as evidence that ovulation and corpus-luteum formation had not occurred in these ovaries. In 2 of these patients such inferences were confirmed by direct observation of the ovaries.

Hamblen and Ross are cognizant of the errors inherent in a diagnosis of anovulatory failure. They believe, however, that the employment of the methods of endometrial interpretation described previously by one of them permits a reasonably safe working clinical diagnosis of such a state. Their inability to observe corpus-luteum formation in the ovaries of patients with anovulatory failure is their strongest evidence of the ineffectiveness of such therapy. It may well be, however, that such ovaries may be unable to respond to such principles because of the mechanical changes occurring in them, thickened tunica and cystic degeneration.

On the basis of the material available in the 85 cases studied to date, including the 7 reported at this time, it seems warranted to assume that if gonadotropic principles are capable of inducing ovulation and corpus-luteum formation in the human, effective pharmacological doses have not yet been given. Such a dose probably is in excess of a daily dose of 8,000 R U, or of a total dose of 20,000 R U.

ANTHONY F. SAVA, M.D.

Rhoads, J. E., and Terrell, A. W. Ovarian Fibroma with Ascites and Hydrothorax. *J. Am. M. Ass.*, 1937, 109: 1684.

A fibroma of the ovary is an uncommon tumor and rarely may be associated with hydrothorax as well as with ascites. The authors note that from the standpoint both of prognosis and of treatment it is important to know of this association of pleural effusion with a benign pelvic tumor. Most pelvic tumors causing pleural effusion are malignant and the effusion is the result of pleural or pulmonary metastasis. In the presence of massive pleural effusion, even after partial aspiration, it may be impossible to exclude the presence of pulmonary metastasis by x-ray examination. In these instances, the occurrence of hydrothorax in association with a pelvic tumor justifies abdominal exploration.

The authors point out that it is only recently that recognition has been made of the syndrome of fluid in the chest in association with ovarian fibroma. In most instances the chief complaints were shortness of breath or discomfort and pain in the chest. In each of 7 cases reported by other workers, the hydrothorax disappeared following removal of the ovarian tumor. A study of a case seen by the authors is reported in detail. A detailed study is also presented of the 9 cases recorded in the litera-

ture in which ovarian fibroma had occurred with ascites and hydrothorax.

Although the uniformly good results following removal of the fibroma indicate a causative relationship between the tumor and the ascites and hydrothorax, no satisfactory explanation of the hydrothorax has as yet been suggested.

HERBERT F. THURSTON, M.D.

EXTERNAL GENITALIA

Goodall, J. R., and MacPhail, F. L. The Surgical Treatment of Cysts of the Vulva and Vagina. *J. Obst. & Gynaec. Brit. Emp.*, 1937, 44: 1097.

The common cysts of the vulva and vagina are due either to deranged function of the normal structures, or to the activity of embryonic rests. In the former group are Bartholin cysts, simple or infected, suburethral cysts, and nabothian cysts. In the second group are the simple vaginal cysts, congenital cysts of the broad ligament extending down the vaginal wall, and cysts from the remnants of Gartner's ducts. The authors believe that the common treatment of excision is disfiguring, sometimes complicated, and often entails an unduly long convalescence. They contend that simple evacuation with destruction, or merely evacuation with fenestration, is preferable.

The authors believe that many of the abscesses of Bartholin's glands are not due to gonococcal infection. The treatment recommended for a Bartholin cyst is the same as that for an abscess. The cyst is opened by a linear incision well out on the vulval surface. The cavity is explored, dried, and cauterized either with the actual cautery or, preferably, by pure carbolic acid carefully applied on cotton swabs, followed by neutralizing alcohol. The cavity is tightly packed with iodoform gauze, this is not removed completely until the eighth day. The patient can usually go home the day after the operation.

Suburethral cysts and abscesses rarely exceed the size of a hen's egg. They originally communicate with the urethra, from which they probably arise. Excision entails the danger of entering the bladder, destroying the urethral sphincter, or producing a urethrovaginal fistula. The authors recommend that a small window be made into the cyst or abscess through the vaginal wall. The vaginal mucosa may be sutured to the lining of the cyst. If pus is present, a gauze wick is left in for a few days. Such treatment results in rapid healing, with permanent closure of the aperture into the urethra.

The perineal inclusion cysts seen at the vaginal outlet in parous women are seldom large enough to cause symptoms. When such cysts cause symptoms, the treatment is excision.

Regarding nabothian cysts, the authors have the following to say: (1) nabothian cysts do not cause symptoms, (2) the visible ones are but a fraction of a general cystic state of the entire cervix, (3) they are merely one expression of a diffuse cervical infection.

If conditions are not such that light cauterization of the surface is indicated, as for catarrhal cervicitis there is no treatment.

Vaginal cysts are chiefly confined to the upper third of the vagina and are usually simple. The treatment recommended is merely incision of the cyst cutting out a window appropriate in size to the size of the cyst and leaving it alone. In two weeks nothing is left. These cysts may often be treated without anesthesia.

DANIEL G. MORTON, M.D.

Cádiz Oyarzun, R. Primary Cancer of the Vagina. Its Surgical Treatment (Cáncer primitivo de la vagina. Su tratamiento quirúrgico). *Rev. Soc. chilena de obst. y ginec.* 1937 2 345.

Primary epithelioma of the vagina constitutes 2.5 per cent of the genital cancers of the female. The prognosis has been bad because of the silent nature of the condition frequently remaining asymptomatic for years allowing the lesion to become well advanced before the patient seeks relief.

Using the classification of Mathew Cornat adopted by the Commission for Cancer of the League of Nations, Grade I cancer of the vagina is localized or limited cancer without associated adenopathy, Grade II is cancer with mobile or discrete adenopathy, Grade III is infiltrating or semi annular cancer with adenopathy. Grade IV is the diffuse carcinoma with invasion of the parametria and adenopathy. The author describes in detail 4 cases of cancer of the vagina observed at the San Augustin Hospital for the past ten years. Each of the 4 cases falls into one of the foregoing groups.

The treatment in the first case consisted of surgery according to the technique of Schuckardt: total extirpation of the vagina, uterus and adnexa under spinal anesthesia. For the cases of Grades II and III respectively the surgical approach was by way of the combined vagino-abdominal routes, and the anesthetic was again spinal. Accidental section of the ureter in one case necessitated reimplantation into the bladder with the technique described by Wagner, but subsequent development of a urinary fistula required unilateral nephrectomy. The case belonging to Grade IV was associated with such widespread metastasis that it was omitted from the presentation. Only the case of Grade II cancer received postoperative radiation.

The results were uniformly good and the cures ranged from one to two-and-one-half years' duration. The author attributes his results to three factors: (a) pre-operative and postoperative care including anti-pyogenic vaccine and repeated blood transfusions; (b) precise dissection of the genital structures with wide extirpation of the lymph glands; and (c) routine drainage in all cases, preference being expressed for the Mikulicz drain.

The roentgenotherapists find that surgery gives a mortality of from 15 to 20 per cent and that only 3 per cent of the results are lasting, with slightly improved results from combined surgery and radia-

tion, whereas radiation alone gives lasting results in from 22.5 to 25 per cent of all cases. Therefore they believe that these cases should be treated by radiation.

The author does not advocate surgery in all cases of cancer of the vagina, but he does believe that surgery is not as disastrous as it has been presented and is still accompanied by some satisfactory results.

GEORGE C. FINOLA, M.D.

MISCELLANEOUS

Frank, R. T., Goldberger, M. A., Salmon, U. J. and Felslin, G. Amenorrhea. *J. Am. M. Ass.* 1937, 100 1863.

Of 27 cases of both primary and secondary amenorrhea 5 were studied less than one month and the remainder from one month to more than one year. The ages of the patients varied from twenty to thirty-seven years. Of the 23 married patients, 16 were sterile. The secondary amenorrhea had existed from five months to nine years. The 6 patients with primary amenorrhea ranged from twenty-three to thirty-three years of age. Twenty-four of the patients showed no endocrine stigmas; 3 had hirsuties and of these 2 had an enlarged clitoris.

In 21 cases complete studies of the urinary excretion of estrogens were made for more than one month. The patients fell into 4 groups according to the amount of estrogens in the excretion:

1. Those with from 50 to 100 mouse units as the total monthly excretion (low). There was no positive estrogenic reaction in 40 cc. of blood in any of 7 cases.

2. Those with from 500 to 518 mouse units (subthreshold). Two of 5 showed estrogen in the blood.

3. Those with from 1,000 to 1,774 mouse units (normal excretion). Four of 6 showed some estrogen in the blood.

4. Those with from 2,075 to 2,328 mouse units (excessive excretion). All showed estrogen in the blood. In the authors' series this group which presented Zondek's polyhormonal amenorrhea was less numerous than anticipated.

In 10 cases complete studies of the urinary excretion of gonadotropic substances were performed for one month or more. The patients fell into 2 groups:

1. Those with high and continuous gonadotropic excretion (4 cases). All 4 of the aforementioned estrogenic groups were represented.

2. Those without gonadotropic excretion (6 cases). Again all 4 estrogenic groups were represented. The gonadotropic blood and urine secretion could not be correlated to the estrogenic conditions and therefore differed from that of normal women in whom the blood and urine show pre-ovulatory accumulation and that of patients in the menopause in whom the blood and urine show continuous and increased amounts of gonadotropic excretion.

The doses of estrogen given for therapeutic effect to amenorrheal patients varied between 16,000 and 1

690,000 rat units (80,000 and 3,450,000 international units) Less than 200,000 rat units gave no response Even with the large doses employed a single uterine bleeding followed in only 2 cases and scant spotting in 2 Approximately one-tenth of the estrogen given is excreted in the urine Gonadotropic substances, extract of pregnant mare's serum and extract from the anterior lobe of the pituitary gland in dosages of from 60 to 510 rat units produce no effect In contrast to the foregoing groups were patients afflicted with obesity, malnutrition, and hypothyroidism, who uniformly responded to appropriate therapy

Amenorrhea does not preclude the occurrence of ovulation or pregnancy The response to estrogenic therapy of amenorrheal patients differs markedly from the response in the menopause The threshold of response in amenorrhea is far higher than in the menopause This difference can be utilized in patients to differentiate between the two conditions, if an excess of gonadotropic substance has been found in the urine Disappearance of gonadotropic substance produced by 30,000 rat units of estrogenic substance warrants the diagnosis of menopause

No useful purpose is served in prescribing estrogens for the treatment of amenorrhea In the dosage used by the authors, gonadotropic preparations likewise proved ineffective It is justifiable to try a very high dosage of gonadotropic preparations when these become available

This study has failed to locate the cause or causes producing amenorrhea Not only refractoriness of the ovary or the anterior lobe of the pituitary gland, but also failure of uterine response must be considered in the etiology

Finally, menstruation returns without any treatment or ascertainable cause in a considerable number of patients

CHARLES BARON, M D

Kennedy, W T Incontinence of Urine in the Female, the Urethral Sphincter Mechanism, Damage of Function, and Restoration of Control *Am J Obst & Gynec*, 1937, 34 576

Of 28 patients reported upon, 26 have had urinary control restored, 1 has an incontinence which may not be permanent, and 1 has sufficient incontinence to indicate the possibility of a second operation

From observations in this study the sphincter mechanism may be described as made up of a free involuntary sphincter surrounding the inner third of the urethra, supported and enhanced by a voluntary sphincter composed of the anterior portions of the levator muscles, which unite in a median raphe beneath the urethra The greater sphincteric force was found to exist about the middle third of the urethra

One may deduce that the above sphincter mechanism also lies around and beneath the middle third, having more and stronger fibers in this location

A woman who has never been in labor but who begins to suffer a partial incontinence of urine due to loss of sphincter control may have had an incomplete union of the fibers composing (1) the involuntary sphincter and (2) the voluntary sphincter

Labor may injure (1) the involuntary sphincter by directly or indirectly causing it to be distorted and fixed to the ramus of the pubis, thereby very markedly diminishing its function as a sphincter, and/or (2) the voluntary sphincter by splitting its fibers parallel to the urethra in or adjacent to the median raphe

In the most difficult cases, namely, those previously operated upon for incontinence of urine and those in which the sensation of control or voiding was lost, continence was restored The most important step of the operation is the free mobilization of the periurethral tissues from the ramus of the pubic bones

In 28 reported cases the only complete failure occurred in a case in which operation was followed by an infection in and sloughing of the anterior vaginal wall

Since the method offered to restore continence of urine is followed by a reasonable degree of success, it is logical to deduce that the description of the sphincter mechanism is approximately correct

EDWARD L CORNELL, M D

Grad, H.: The Bissell Operation for Cystocele *Am J Obst & Gynec*, 1937, 34 589

This article deals with a series of 100 cases of cystocele Included in this group were 36 cases of procidentia uteri, 14 of which were of third degree In 6 of the 14 cases (42.2 per cent) of complete prolapse, a vaginal hysterectomy was added to the Bissell operation, and in 1 case a Watkins interposition operation was performed

There were 97 anatomical restorations of parts with symptomatic cures The subsequent history in the 3 cases in which the operation failed was as follows

One patient was re-operated upon a year after the first operation A Bissell cystocele operation was again performed, this time it effected a cure The second of these patients was successfully re-operated upon and is now able to wear a pessary which gives her complete relief Before this operation she was unable to wear one The third patient has a sagging of the cystocele, but is symptom-free and needs no further operative treatment

EDWARD L CORNELI, M D

THE LATE TOXEMIAS OF PREGNANCY (SO-CALLED NEPHRITIC TOXEMIAS OF PREGNANCY)

Collective Review

ROBERT D. MUSSEY, M.D. and ARTHUR B. HUNT, M.D., Rochester, Minnesota

CLASSIFICATION

OBSTETRICIANS recognize the need of concise, clear definitions of the so-called toxemias of the latter months of pregnancy, that is, the need of a standard working classification of these conditions.

It is not the intention of the writers of this review of the literature of the past few years to attempt to develop such definitions. We agree, however, with Peckham (83) that there is sufficient unanimity of opinion on this subject among various authors arbitrarily to drop the word 'nephritic' from the title. The term 'nephritic' implies that the so-called toxemias of pregnancy are owing to some nephropathy or that the nephritic condition antedated the pregnancy, whereas evidence indicates that the nephritic manifestations are not the cause but rather one of the manifestations of the toxemia nor can the term 'nephritic toxemia' be correctly applied to chronic nephritis antedating the pregnancy. In a workable classification the so-called toxemias may be divided into the acute non-convulsive (pre-eclamptic) and the convulsive (eclamptic) toxemias; the entire syndrome develops in the course of a given pregnancy and is distinct from the chronic cardiovascular renal conditions with which the woman was affected prior to the pregnancy in question.

Kellogg (54), Peckham (83), Mussey and Randall (79), Herrick and Tillman and others agree that there is a definite distinction between the chronic vascular or renal disease which antedates pregnancy and the acute, late toxemia which develops in the course of pregnancy and which may pass from mild to severe stages and may culminate in eclampsia. The allocation of all cases of toxemia into the preceding classification is manifestly impossible; the additional term 'unclassified nephropathies' or the term 'unclassified toxemias' employed by Stander could be used to include the obscure cases and the rare or comparatively rare conditions such as true acute

nephritis complicating pregnancy and nephrosis of pregnancy.

PATHOLOGY

The hypothesis that general vascular disease plays a large part in these toxemias of pregnancy is strengthened by pathological evidence, by clinical findings and by follow up studies. Irving stated that the hepatic lesions noted in 1931 by Acosta Sison and in the same year by Davidson had been confirmed by, to use Irving's own words, 'the work of our pathological laboratory.' Irving went on to say that the hepatic lesions of eclampsia may consist of hemorrhage, necrosis or fatty degeneration; that these lesions may occur in any portion of the lobules, that one, two, or all three varieties of lesions may exist in the same case and that thrombosis of the radicles of the portal vein or of the small branches of the hepatic artery occupying the portal spaces may be found which places the hepatic lesions on a vascular basis.

Schnur and Dorsett confirmed the findings of Tahr and of Lubarch in observing changes in the glomerular capillaries of patients who had died of eclampsia: the glomerular capillaries had distorted, and sometimes adherent, loops with poor cellular outlines and few nuclei. Bell found a glomerular lesion which he described as characteristic of the hypertensive toxemia of pregnancy; it presented enlarged glomeruli with narrowed and sometimes closed lumina caused chiefly by marked thickening of the capillary basement membrane. Dunn and others supported Bell's findings. Kellogg (55) described maternal obtained at necropsy in a case of pre-eclamptic toxemia presented by Hertig in which the lesions of the liver, kidneys and brain were the same as those of eclampsia except that the basement membrane of the renal glomerulus had not reached the stage of irregular thickening maintained by Bell to be characteristic of eclamptic kidneys.

Describing the pathogenesis of eclampsia, Addis stated that angio-spasm is a common pathogenic factor underlying and uniting all the varying expressions of eclampsia. He commented that angio-spasm spreads out into the various tissues

and organs and produces effects which in themselves appear to be completely unrelated. In the brain it results in hypertensive encephalopathy, in the kidneys, in albuminuria and oliguria with urine of high specific gravity, in the liver, in periportal necrosis, and in the subcutaneous tissue, in anasarca. He suggested that these variations are the result not of varying causes but of the variety of tissues in which the angiospasm acts, and that there is a single pathogenic factor underlying and uniting all the manifestations of eclampsia, namely, angiospasm. McKelvey and MacMahon presented similar observations on the lesions in the vascular systems of patients injured by toxemia of pregnancy who later had died. Zimmerman and Peters published a report of 23 cases, including findings at necropsy, which indicates that some of the patients who died of eclampsia had evidence of antecedent or accompanying pyelonephritis. Yet Acosta-Sison reported evidence of pyelonephritis in only 1 case of 38 in which necropsy was performed after death from eclampsia.

IDEAS OF ETIOLOGY

Hypotheses of etiology given in the recent literature are predicated on many possible factors, among which are absorption of toxins resulting from pathological changes in tissue, excessive or pathological internal glandular secretions, focal or other infection, and faulty diet and allergy.

Bartholomew and Kracke postulated that hypercholesterolemia of pregnancy may predispose to placental infarct, autolysis of the affected tissue, and may be related to the production of peptone, guanidine, and histamine, which produce the pathological changes of eclampsia. Tenney observed that syncytial degeneration was definitely increased, both in the amount of tissue affected and in severity, in cases of pre-eclampsia and especially in those of eclampsia.

Hofbauer postulated that the absorption of syncytial proteins and ferments from the placenta impairs the function of the liver and the capillaries and causes hyperactivity of the pituitary body, along with the adrenal and thyroid glands, this hyperactivity in turn causes derangement of inner oxidation and of water metabolism, and arteriolar spasm in vital organs. Following the publication of Hofbauer's hypothesis, both Hurwitz and Bullock, and Byrom and Wilson working independently, failed to find pressor and anti-diuretic substances in the blood of patients who had toxemia of pregnancy. However, Hoffman stated that this hypothesis has received a series of confirmations. He stated that Marx found four times the normal amount of anti-diuretic component of the

posterior lobe and that Bohn, Marx, and Eufinger found vasopressor substances of hypophyseal character in the blood of eclamptic patients. Melville cited research which indicates that the anti-diuretic substance described by Anselmino and Hoffman has not been adequately proved to be pituitary hormone.

Smith and Smith (100, 101) found remarkably consistent curves representing prolactin and estrin in the blood and urine throughout pregnancy, and unmistakable variations of these curves in the late toxemia of pregnancy. In toxemia, excess amounts of prolactin with a tendency toward a low value for estrin were characteristic. The authors offered the suggestion that overproduction of prolactin by the placenta is perhaps a related, if not a causal, factor in the etiology of the toxemia of late pregnancy. From an analysis of weight, hirsuties, stature, facies, form of pelvis, and observation of a relatively low basal metabolic rate among a group of pregnant women, Vorzimer and his co-workers concluded that the large majority of instances of toxemia of pregnancy occurs among women whose constitutional habitus is in itself a manifestation of endocrine disturbance.

In a review of 420 cases of toxemia, Peters and his co-workers found that 13 per cent of the patients suffered at one time or another from conditions usually included under the term "pyelitis" or "pyelonephritis." Hayes cited 20 cases of pre-eclamptic toxemia and eclampsia "cured" by ureteral drainage of the kidneys to relieve back pressure, which he postulated as the cause of the toxemia. In a somewhat different application of the hypothesis of infection, Johnston, Johnson, and Nicholas found that focal infection affecting the placenta releases tyramines, which produce the toxic syndrome. However, Theobald had previously observed the almost complete absence of eclampsia in Siam, where infection of the urinary tract is prevalent. Strauss has noted the relationship of nutritional deficiency, hypoproteinemia, and elevated venous pressure to the retention of water in pregnancy. He corroborated the observations of Eufinger, Plass, Eastman, and others who found a lowered concentration of plasma protein in pre-eclamptic toxemia and eclampsia. On the contrary, Dieckmann found a concentration of the blood and plasma, which he stated is not the cause of the eclampsia but "is intimately associated with the convulsions, coma, oliguria, and the various cerebral, visual, and gastro-intestinal symptoms." McIlroy (68) offered the hypothesis that a considerable proportion of the toxemias of pregnancy arise as a result of an inborn error of metabolism and that the

process depends to no small degree on dietetic factors such as an inadequate supply of iron iodine, calcium and possibly other inorganic substances. Richardson studied the calcium content of the blood of normal and lactating pregnant women and of those who had pre eclampsia and eclampsia and he expressed the belief that the weight of evidence indicates that deficiency of calcium is a primary factor in pre eclamptic toxemia. He expressed the opinion that there is strong evidence to support the hypothesis that guanidine is responsible for eclamptic convulsions and that under ordinary conditions guanidine is neutralized by calcium.

It is not surprising to find late toxemia of pregnancy among the many diseases attributed to allergy. Knepper's experiments with injection of the hormone of the posterior lobe of the pituitary body produced in the organs changes typical of eclampsia and he suggested that this indicates that eclampsia is a combination of increased production of the posterior pituitary hormone with an allergic reaction in the tissues. Jegorow offered the hypothesis that eclampsia is of allergic origin, and Coope expressed the belief that the allergic hypothesis is more than a groundless speculation. Moore and Williams stated that anemia is a predisposing cause of the toxemia of pregnancy, as they have noted that the incidence of the signs and symptoms of toxemia is higher among untreated patients who have anemia.

PATHOGENESIS

The concept of the presence of a general vascular disturbance in the late toxemias of pregnancy was advanced by Volhard in 1919. He postulated that this vascular change is at first a functional condition which in the kidneys produces ischemia of the capillary loops, an angospastic type of anemia. This hypothesis was strengthened by the observations of Hinselmann (44). Baer and Reis and others who noted evidences of spasm of the capillaries of the nail fold in cases of pre eclampsia. Hinselmann and his co-workers found similar capillary changes in the kidneys of most eclamptic patients. Changes in the arterioles of the retina were noted by Wagener (113) and others who observed definite evidence of arteriolar spasm which might vary from day to day. In fact, Wagener (113) could determine in most instances, whether the patient was better or worse, by following the retinal changes. His findings have been corroborated by Masters, Hallum and Selinger all ophthalmologists. In 1927 Corwin and Herrick stressed the etiological relationship between acute cardiovascular disease and

toxemia of the later months of pregnancy. Mussey and Keith, and later Mussey and Handall agreed that generalized capillary and arteriolar disease offered an adequate explanation for the vascular and renal symptoms of this disease. Irving Herrick and Tullman Addis and Eastman have made especially notable contributions in support of and Coope has accepted evidence of the presence of vascular involvement in the form of arterial spasm in pre-eclampsia and eclampsia.

This conception of the presence of a widespread vascular lesion in the late toxemias of pregnancy has aided in an understanding of the permanent cardiovascular or renal injuries which may follow toxemias of pregnancy. The full realization that the condition of numerous women who have chronic cardiovascular disease or chronic nephritis is definitely the result of previous acute pre eclamptic toxemia, or eclampsia has been brought about by many follow up studies. Corwin and Herrick's article, previously mentioned gives an excellent survey of chronic cardiovascular and renal disease resulting from acute toxemia of pregnancy. In other articles prior to 1930 by Caldwell and Lyle, Harris, Rockwood, Mussey and Keith and by Peckham (81) the authors had stressed chiefly the then meager evidence that in many of the cases in which patients were severely ill with acute toxemia of pregnancy chronic nephritis subsequently developed. Follow up studies will be considered in more detail later.

INCIDENCE

The incidence of the acute late toxemias of pregnancy is probably higher than previous figures would indicate. A quarter of a century ago pre eclamptic toxemia was said to occur in association with several of every 100 pregnancies. Stander reported in 1929 that the incidence of late toxemias of pregnancy including nephritis was about 8.5 per cent. In 1936 he raised this figure to about 10 per cent. Peckham stated that his figure based on the total of registered patients on his hospital services is 17.4 per cent and he estimated that the incidence is between 10 and 15 per cent for the child bearing population at large. While they were collecting 173 instances of eclampsia among 168 patients, Teel and Reid found a gross incidence of 1 case of eclampsia in 330 pregnancies but excluding 127 emergency cases the corrected incidence was 1 case of eclampsia in 2200 cases registered in a prenatal clinic. Hauch and Lehmann found in Denmark an incidence of 1 case of eclampsia in 571 pregnancies. Kjelland, Mordie of Oslo reported that an investigation of 52 pregnancies of 48 women who previously had

had eclampsia showed that 30 had recurring renal involvement in the course of pregnancy Kellogg (55), and later Mussey, reported recurrence of toxemia of 80 and 57 per cent, respectively, in groups of patients who had been observed to have toxemia during 2 or more pregnancies

DIAGNOSIS OF CHRONIC VASCULAR OR RENAL DISEASE ANTEDATING PREGNANCY AND OF ACUTE LATE TOXEMIA OF PREGNANCY

It is often difficult and sometimes impossible to distinguish between either pre-existing chronic general vascular sclerosis or chronic nephritis (glomerulosclerosis), which may complicate pregnancy, and the acute toxemia which makes its appearance in the latter months of pregnancy. Because of this difficulty in diagnosis it is not possible to discuss the late toxemias of pregnancy without considering also these chronic vascular or vascular-renal conditions

In many cases chronic hypertensive disease or chronic nephritis is discovered only when the patient presents herself for prenatal examination, although most of those cases in which the condition is caused by toxemia in a previous pregnancy could have been detected by persistent postnatal follow-up examinations. Peckham (82) stated that in a large proportion of cases in which hypertension and albuminuria are manifested in the course of pregnancy, the condition is on a basis of pre-existing vascular disease and that the course of a pre-existing vascular disease is accelerated markedly by pregnancy and the patient is left in a much more serious condition than before. One may add that so-called occult nephritis may not be amenable to diagnosis prior to pregnancy and some of the patients who are mildly hypertensive may pass through pregnancy without superimposed toxemia. Kellogg (55), Peckham (82), and others agreed that the differential diagnosis between the "nephropathies" and pre-eclampsia is not always possible. Kuder and Stander found that repeated applications of the creatinine excretion test, the urea-clearance test, and the fifteen-minute phenolsulphonphthalein test are of value in making a diagnosis of chronic nephritis and that normal values determined on chemical examination of the blood do not rule out chronic nephritis so mild as not to cause retention of nitrogen. Cadden and McLane agreed with these statements and recommended the urea-clearance test as the most sensitive method so far devised to recognize early or mild nephritis. In addition to agreeing with Stander concerning chemical determinations on the blood, Peckham (82) pointed out that three clinical factors are of value in the

diagnosis of mild arteriosclerotic nephritis (1) the appearance of hypertension and albuminuria in the first two trimesters of pregnancy point toward nephrosclerosis rather than toward acute toxemia, which usually does not manifest itself before the last lunar month and rarely before the seventh month, (2) repeated or recurring toxemia is almost always on a nephrosclerotic basis, and (3) ophthalmoscopic examination of the retina in the presence of mild arteriosclerotic nephritis will reveal evidence of arteriosclerotic changes or albuminuric retinitis, while similar examination in the presence of acute hypertensive toxemia will reveal spasm of the retinal arteries, retinal edema, and occasionally hemorrhage or detachment. We are heartily in accord with Peckham's (82) three clinical diagnostic factors. Among these factors the early appearance of symptoms is probably of greatest clinical importance. The value of retinal examinations in the majority of cases of acute toxemia and in those of marked chronic arteriosclerotic nephritis is evident, but we have seen an appreciable number of cases of mild chronic nephritis in which there were no demonstrable retinal changes. Mengert stated, "The ease of diagnosis of existing or pre-existing renal disease depends largely on its severity. The more severe the kidney lesion, the earlier in pregnancy it becomes manifest and the easier its diagnosis."

While tests of renal function are often of value in cases of well marked chronic arteriosclerotic nephritis, few observers seem to believe that chemical examinations of the blood are commonly of much practical value in acute toxemias. Stander and Cadden stated that chemical analysis of the blood is an indispensable index of the severity of the disease and of specific treatment needed. They found that the uric-acid content of the blood is increased in eclampsia and pre-eclampsia, which indicates its failure of destruction in the liver and that its concentration in the blood is a fairly safe criterion of the severity of the disease, they found, also, that the carbon-dioxide combining power is the most readily available index of the decrease of alkali reserve, which may indicate the necessity of treatment to combat acidosis. Kellogg (55) remarked that the increase of uric acid in severe pre-eclamptic toxemia is not always present. Dieckmann (20) found that the alterations in blood volume and plasma volume in eclampsia and in pre-eclampsia are identical but that they are definitely at variance with those in chronic hypertension or nephritis. He advised tests for determination of non-protein nitrogen when the urine passed in twenty-four hours in a case of pre-eclamptic toxemia or of eclampsia is

less than 1000 c cm and the specific gravity is less than 1.010. Dieckmann (19) also expressed the belief that microscopic examination of the urine if done by the Addis method which entails examination of a concentrated specimen collected over a known period of time, has been of the utmost value for diagnosis, prognosis, and treatment.

In a recent review of the literature Kellogg (55) stated that tests of renal function are not dependable and that dilution and concentration tests of the urine give abnormal values in the course of a normal pregnancy. Randall Murray, and Mussey employed the cold test as a prenatal examination, to estimate reaction of the vasomotor system in response to cold. In a preliminary report on its use in 104 cases they said that in none of those cases in which the response was persistently normal had toxemia developed and that a third of the patients who had a hypertensive reaction afterward presented the usual signs of toxemia in the later months of pregnancy. These observers did not use the cold test on toxemic patients as did Dieckmann and Michel (21, 23) who reported no uniform results in this group of cases. This cold pressor test may prove to be of value as a test in early pregnancy, to determine the cases in which toxemia of late pregnancy is more likely to develop. Dieckmann and Michel (21) observed the vascular renal effects of posterior pituitary extracts on pregnant women. They found that both the decrease in the volume of urine and the average rise in systolic blood pressure which occurred when these extracts were injected into normal, pregnant parturient and puerperal women were much more marked when the extracts were given to pre-eclamptic patients than to those not afflicted with pre-eclampsia. They concluded that the pituitrin test may aid in distinguishing pre-eclampsia from other toxemias of pregnancy, and if used early in pregnancy may make possible the detection of cases in which pre-eclampsia may develop subsequently.

COMMENT ON DIAGNOSIS

Recent literature on differential diagnosis indicates that (1) the appearance of the symptoms of hypertension and albuminuria in the first or second trimester of pregnancy is almost conclusive evidence that at least some degree of general vascular or glomerular injury antedated the pregnancy. (2) examination of the retinas of such patients usually will reveal evidence of previous acute vascular or renal disease. (3) certain chemical examinations are of diagnostic value when the previous injury has been severe enough definitely

to lower the function of the renal glomeruli or in cases of acute pre-eclampsia when the function of the liver is definitely disturbed. (4) the cold test seems to indicate, by the degree of vascular response which women are susceptible to the development of hypertensive disease, and (5) the pituitrin test may prove to be a valuable aid in differential diagnosis when used early in pregnancy.

TREATMENT

Chronic hypertensive vascular disease and chronic nephritis. The methods used in management of patients who have chronic hypertensive vascular disease or of those who have chronic glomerulonephritis depend on the degree of vascular or renal involvement and the definiteness or perhaps one should say ease in making the diagnosis. Those patients who exhibit a mild degree of hypertension early in pregnancy who were represented by Kellogg (55) in a hypothetical case with a systolic blood pressure of 140 mm of mercury and a diastolic blood pressure of 90 mm, or even perhaps with a somewhat higher systolic pressure who have at most a trace of albuminuria whose renal function is within normal limits and whose ocular fundi do not reveal appreciable evidence of hypertensive change or of the 'reimits' of nephritis may be treated expectantly. If treatment is expectant, physician and patient must accept more than the average risk of aggravation of the existing condition by superimposed toxemia for Tillman Teel and Reid and others have shown that there is a marked tendency for acute toxemia to be superimposed on these chronic vascular conditions. Kellogg (55) properly queried: What results may we expect? Will the pregnancy be successful and at what cost? Will it fail with perhaps irreparable damage or will it fail or succeed with no apparent damage? If the chronic hypertension is of the so-called essential type and is unassociated with lowered renal function the patient has a much better chance of carrying through successfully than if the condition in which is present followed an acute toxemia late in a previous pregnancy. The patient may have a normal or a practically normal blood pressure and evidence of or a history of a very mild degree of chronic nephritis. We agree with Kellogg that such a patient may pass through pregnancy successfully. When such a patient is treated expectantly it is highly important to carry out a regime of moderate diet, regular bowel movements and definite limitation of activities. Sufficient sedatives to control nervous irritability should be given and the use of alcohol, tobacco, and stimulants should be forbidden.

In the presence of chronic vascular disease of more than mild degree, or in the presence of definite chronic glomerular nephritis, the belief expressed by Kellogg (55), Stander, Peckham (82), Dieckmann (19), Goodall, and others is that interruption of pregnancy should be advised in the interest of the mother. At best, the fetal mortality is high and in many of the severe cases the fetus dies in utero in the course of the second or early in the third trimester, and labor ensues. Kuder and Stander found that more than 40 per cent of women died within ten years of chronic nephritis recognized in the course of pregnancy.

Herrick summarized the indications for abortion in chronic arteriosclerosis and chronic nephritis as follows. "If the disease is manifest at conception, abortion should be done promptly. If the disorder has been latent and arises early in pregnancy, and if it is marked by a considerable albuminuria which tends to increase despite treatment, it is unlikely that pregnancy can succeed. In the interest of maternal welfare it should be terminated. If to albuminuria is added edema or hypertension, this action becomes obligatory. If the symptoms of nephritis do not appear until the second half of gestation a somewhat different attitude is to be taken. One is confronted with the question whether or not the pregnancy can be carried to viability. In such a situation much judgment and not a little courage are required. If nephritic symptoms are mild and do not progress rapidly, delay may be safe and the child may survive despite albuminuria, edema and hypertension. However, if the disturbance advances and if to these cardinal features are added serious visual disturbances, threatening blindness, advancing nitrogen retention, deviations from normal mentality, twitching, greatly exaggerated reflexes or convulsions, the uterus should be emptied promptly without regard for the fetus."

Williams stated that even in the less severe cases of permanent "arteriolar sclerotic nephritis," the procedure of interruption of pregnancy followed by sterilization is being adopted rather generally. Williams, Mendenhall, Dieckmann (18), and others have used hysterotomy combined with sterilization if gestation has progressed to the third month or beyond, and Dieckmann mentioned the employment of hysterectomy in selected cases. In older women Williams employed roentgen rays for the purpose of sterilization.

Acute non-convulsive toxemia. Many writers have expressed the belief that the same factor appears to be responsible for the various conditions included among the late toxemias of pregnancy, that mild and severe pre-eclamptic (non-

convulsive) toxemia differ in degree only and tend to proceed to the stage of eclampsia (convulsive toxemia). Herrick, Tillman and Grebene, Kellogg, Mussey, and Randall, Dieckmann (19), and others expressed the opinion that low reserve kidney, so-called albuminuria of pregnancy, and mild pre-eclamptic toxemia are probably the same condition. According to Peckham and Stout, Douglas, and others, in about a third of the cases in which the diagnosis of "low reserve kidney" has been made later, the same residual injuries have been found as have been found in cases of true toxemia. These writers have expressed the belief that for purposes of therapy, the patients who have mild as well as those who have severe toxemia should be considered as potential eclamptic patients and may, after parturition, harbor a residue of chronic arterial or renal disease.

The significance of the appearance of the classical signs of incipient pre-eclampsia, such as more or less elevated blood pressure (135/90 or more), excessive gain in weight and edema, and slight albuminuria, finds repetition in the recent review by The American Committee on Maternal Welfare (117). In addition to selecting individuals who present these signs for closer and more frequent prenatal examination, mild sedation, rest, and dietary restrictions (reduction of intake of sodium chloride and proteins) are prescribed. Strauss, Eastman, and others expressed the belief that the intake of protein need not be restricted, as the serum proteins may be low (in the presence of albuminuria), a finding Dieckmann has not been able to confirm. McIlroy (68) and other British obstetricians gave as their opinion that a diet sufficient in vitamins and in inorganic constituents, such as calcium, iron, and iodine, is vital in preventing and treating pre-eclampsia. Thomas and others stated that calcium is useful in replacing the sodium ion, promoting diuresis, and protecting the liver. Mendenhall and Drake seemed to observe some lessened incidence and severity of pre-eclampsia with the administration of calcium and Vitamin D, although no claims for its use were advanced. However, Richardson (88) was convinced that the use of sufficient Vitamin D during pregnancy will definitely lessen the incidence of pre-eclamptic toxemia and eclampsia.

The Smiths (100, 101) and Heim pointed to a constant elevation of prolactin with depressed estrin in pre-eclampsia and eclampsia. This has led Shute to employ estrin in the treatment of a very small group of pre-eclamptic patients. On the contrary, Robson and Paterson used progesterone in 12 cases of pre-eclampsia and noted clinical improvement, with no convulsions or mortality.

The symptoms of true pre eclamptic (non convulsive) toxemia rarely become evident before the third trimester and often not before the last month of gestation. If a systolic blood pressure of less than 150 and a moderate amount of albumin in the urine are selected as indicative of the upper limit of mild toxemia, it may be assumed that most of the patients who exemplify these signs should be observed frequently and need not be hospitalized unless the evidences of toxemia become more marked. When this occurs, or if progressive changes in the retinal arterioles are observed, as occasionally they are in this group of cases, the patient should be hospitalized. Sometimes an initial rise in systolic blood pressure, to 160 or more, places the patient immediately among those who have severe toxemia, or perhaps the patient may be observed for the first time late in pregnancy and marked hypertension or albuminuria may be discovered. In either event immediate hospitalization is highly desirable. Often the condition of the patient who has severe pre eclampsia so nearly approaches the eclamptic state that employment of measures to prevent development of convulsions should be carried out diligently. Kellogg (55) stated that the treatment of pre eclampsia should be as radical as the treatment of eclampsia is conservative. He, Rosensohn, and others recommended treatment essentially similar to that advised by The American Committee on Maternal Welfare that is rest, quiet sleep, light mixed salt free diet, adequate bowel movements induced by the administration of gentle laxatives or enemas, balanced fluids, observation including recording of blood pressure and output of urine, and interference when necessary. McNeile reported on 799 patients who had late toxemia of pregnancy and who were treated with magnesium sulphate with only 4 deaths, 259 were of the eclamptic type. If necessary, 20 c cm of a 10 per cent solution of magnesium sulphate are given intravenously every hour for as many as 6 doses. McNeile expressed the belief that the administration of magnesium sulphate together with carbohydrates to severely sick patients has the effect of eliminating radical surgical operation except when it is clearly indicated. May quoted Arnold and Fay's program of dehydration and reported that among 20 pre eclamptic patients so treated eclampsia, abruptio placentia, or maceration of the fetus did not develop and all carried to term. Several authors have noted the value of intravenous administration of glucose solutions in producing diuresis and hepatic regeneration.

Gustafson, Rosensohn, Kellogg (55) and others warned that failure of improvement or increase in

the severity of symptoms indicates the necessity of termination of the pregnancy. In addition to hypertension and other findings, Mussey, Wagner (114), Masters, Hallum and others have found study of the retinal arterioles of value in determining whether and when pregnancy should be terminated. However, Kellogg (55) and Falls failed to find it of definite value for this purpose. Gustafson stated that the method of interference may depend on a number of factors: the age, parity, and general condition of the patient, the duration of pregnancy, and the condition of the cervix. Gustafson advised insertion of a bag or rupture of the membranes if the bony passage is adequate and the condition of the cervix permits. Kellogg (55) has discontinued the use of the bag but he agreed, as do many others, that rupture of the membranes often is indicated. When induction is indicated and the need is not urgent, we are among those who sometimes employ medical means of induction if successful this obviates the necessity for mechanical intervention, but such intervention can be used later if necessary. Kellogg (55), McNeile, and Gustafson advised against abdominal cesarean section unless the age and condition of the patient, the condition of the cervix, or the type of pelvis indicate its necessity. If cesarean section is performed, local anesthesia is preferred.

Eclampsia. Adair, among others emphasized the generally accepted fact that adequate prenatal care will do much to eliminate eclampsia. In spite of this care and of every known method of treatment eclampsia may occur and may be fatal. Eclamptic convulsions present an immediate emergency which calls for active but not radical treatment. The necessity of controlling the convulsions is obvious. At the same time therapy is instituted to relieve edema and promote diuresis to protect the liver, to prevent the development of dangerous acidosis, and, at the proper time to terminate pregnancy if this becomes necessary.

ACTIVE TREATMENT

Sedation. Sedation requisite to control the convulsions should be used promptly as soon as eclampsia develops. Dieckmann pointed out that since all drugs are toxic in doses necessary to control the convulsions we prefer to use several simultaneously. Smaller amounts are, therefore, required and the undesirable effects of each are minimized.

Morphine. Morphine for years has been the most dependable drug because of its sure sedative action and its general availability. The dosage

varies from $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.016 to 0.032 gm) according to the apparent severity of the toxemia and the weight of the patient. Whether the dose should be repeated depends on whether other sedatives are used and on the progress of the disease. Kellogg (55) stated, "Morphia in any quantity produces torpor and its aftermath may be irritability." Morphine also has the disadvantage of increasing existing acidosis by respiratory depression.

Solution of magnesium sulphate This substance, first reported by Lazard for the treatment of eclampsia, is commonly used intravenously or intramuscularly. In addition to its sedative effect, it relieves edema and promotes diuresis. Use of this drug forms an important part of the conservative treatment employed by Lazard, McNeile, Rucker, and others, with excellent results in large groups of eclamptic patients. McNeile expressed the belief that larger doses can be given with more safety than formerly was supposed. He stated that he gives 20 ccm of 10 per cent solution intravenously, repeating every hour or so up to 6 doses, or until the convulsions are controlled. Following the use of magnesium sulphate, McNeile had not seen any disturbance of respiration or any deleterious effect. However, Kellogg advised the use of not more than 6 gm of this drug in twenty-four hours. Hirschfelder warned against hypermagnesemia, particularly after oral administration, and Dieckmann warned against the use of large doses when oliguria or anuria is present.

The barbiturates Phenobarbital and phenobarbital sodium, pentobarbital sodium and sodium amylal (sodium isoamylethylbarbiturate) all have proved valuable as adjunct sedatives and the latter two have been reported by some writers to have successfully controlled convulsions when given with caution intravenously. Ross discussed the use of pentobarbital sodium and Gustafson, Lewis, King, Mayer, and Ayo the use of sodium amylal for this purpose. In selected cases of eclampsia we have given from 6 to $7\frac{1}{2}$ grains (0.4 to 0.48 gm) of pentobarbital sodium slowly, intravenously, with large volumes of solution of glucose, and have had success. McGee expressed the opinion that large doses of barbiturates lowered the blood pressure so that oliguria might develop.

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THE TERMINATION OF PREGNANCY

Although it is known, beyond much doubt, that products of conception are in some way responsible for the syndrome of eclampsia and that the convulsions usually stop when the uterus is emptied, nevertheless experience has shown that termination of pregnancy by surgical methods is generally inadvisable until the convulsions have been controlled. Almost all obstetricians are agreed that the mortality varies greatly with the time, method, and technique of delivery. The belief that forceful mechanical means of emptying the uterus are attended by a high maternal mortality can hardly be questioned. Plass, in a collective review, found the mortality following radical treatment was 21.7 per cent of 4,607 cases and only 11.1 per cent of 5,976 cases in which treatment was by the conservative or "combined"

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method Dieckmann (19) gave a table showing this and other comparisons and The American Committee on Maternal Welfare (117) stated 'Careful investigation of the causes of maternal deaths throughout this country has shown that the maternal death rate is more than 20 per cent in many localities following cesarean section or other operative measures for eclampsia. Maternal mortality is reported to be about 5 per cent in series of cases in which treatment is primarily by medical measures. This is particularly true if medical treatment is carried out consistently before measures are used to terminate pregnancy.

The first consideration then is to stop the convulsions. The eclamptic state is accompanied by irritability of the uterus and, in many instances the onset of labor occurs in the course of the convulsions. When labor does not ensue following cessation of the convulsions it is often not difficult, in our experience, to initiate it by giving from 15 to 2 fluid ounces (45 to 60 c cm.) of castor oil by mouth followed by discreetly directed, hourly repeated doses of from 1 to 2 minims of pitocin given subcutaneously for several doses these injections are discontinued as soon as labor like uterine contractions begin. We have not observed any harmful effect following this procedure. If this fails or if it seems advisable not to delay the membranes should be ruptured. Rupture of the amniotic sac with loss of fluid in itself seems to have some therapeutic effect. Jaggard noted this in 1889 and is quoted by DeLee as saying:

Rupture of the membranes cures one third benefits one third, and fails in one third of the cases of eclampsia. Stroganoff found in 308 cases of eclampsia that it was unnecessary to resort to cesarean section when rupture of the membranes was employed. Stroganoff, Dieckmann, Rucker, McNeile and others recommended this procedure as the method *par excellence* when mechanical means are needed for the termination of pregnancy. Dieckmann (19) suggested insertion of a hydrostatic bag into the lower uterine segment in rare instances after rupturing the membranes and drawing off the amniotic fluid. Cesarean section is reserved for obstetrical indications only or in rare cases when the cervix seems too firm too long and not sufficiently effaced to warrant rupture of the membranes. Kellogg (55) Fantus, Gustafson and others expressed the belief that delivery should be effected under local rather than under general anesthesia or the use of the latter should be held to a minimum. The heavy sedation employed prior to delivery makes this easier. Chloroform is definitely contra indicated in eclampsia because of its harmful effect on the liver.

Fantus warned that ether increases the production of mucus in the bronchi and tends to produce pulmonary edema and its use may be followed by pneumonia.

The opinion of most writers is voiced by The American Committee on Maternal Welfare (117) in advising that medical therapy be continued through labor and for a period long enough after delivery to be certain that the patient is recovering and out of danger of further convulsions.

The fetal mortality in eclampsia approaches 50 per cent and Falls has made the excellent rule that the immediate care of newborn infants should be exacting, because frequently these infants are premature and are less vigorous than normal because of toxemia transmitted from the mother. A maternal mortality of 5 per cent or less is at present an excellent figure for eclampsia. The importance of a quiet, restful environment and the avoidance of bodily injury are among other conditions emphasized in recent literature. Shute has treated a small number of patients who had eclampsia with estrin.

FOLLOW UP STUDY

In 1912 under the title 'The late sequelae of eclampsia' Rucker reviewed the reports by 4 observers of 118 cases of eclampsia in which the subsequent course of the patients was followed. A number of these patients had recurring eclampsia and many had recurring pre-eclamptic toxemia. Reviewing the subsequent pregnancies of 29 eclamptic patients Tillman found that eclampsia recurred in only 4 cases but in 38 subsequent pregnancies there was a 16.8 per cent incidence of toxemia. Siedentopf and Major in Leipzig noted, in the follow up study of 16 eclamptic patients and 13 patients who had nephropathies of pregnancy that from twenty eight months to nine years later the cases in which there was damage to the circulatory apparatus and nervous system greatly outnumbered those in which true damage to the kidney had been done. Herrick and Tillman reported a study of toxemia of pregnancy over a period of fifteen years, during which time 930 patients were observed. 594 (52 per cent) of whom had been subjected to at least semi annual examination by the medical staff. Of these 594 women followed for an average of five and 11 tenths years 90 or 15.3 per cent, have died. This is almost seven times the average death rate for women between the ages of twenty and forty five years. Herrick, Tillman and Grebene concluded that it seems probable that the pathological changes characteristic of eclampsia, pre-eclampsia and other vascular types of toxemia are not

transitory but, in more than 50 per cent of the cases, are permanent, and merge into those of chronic vascular disease. These authors later recorded their experience with a group of cases of milder toxemia which were classified variously as "nephritis, albuminuria of pregnancy, recurrent toxemia, and low reserve kidney." In the post-partum period in practically all of the cases there was a fall of blood pressure to normal but in 63, or one-third of 188 cases, hypertension was found on follow-up examination, with a range in systolic blood pressure of from 150 to 260 mm. Peckham (81), who repeatedly has noted the development of chronic nephritis following pre-eclamptic toxemia, found definite evidence of renal involvement in 32 of 63 cases in which the previous diagnosis was low reserve kidney, and in which the course of the patients was followed for five years or more. Gibberd, also, has made extensive follow-up studies of the nephritis which follows "albuminuria of pregnancy." Goodall repeated the observation that the longer toxemia lasts, the greater is the consequent damage to the organism.

According to Effkemann (27), following toxemia there exists often a latent vascular disease which in subsequent pregnancies may lead to nephrosclerosis, particularly if the women are more than forty years of age. However, Effkemann (28) expressed the belief that there is a gradual regression of residual renal changes, quicker after eclampsia than after the nephropathies and after pre-eclampsia, and that the residual renal conditions are relieved in the majority of cases after three years, or at most after from ten to fourteen years. Contrary to the opinion of many observers, he stated that the renal symptoms of women who have residual conditions are not influenced by subsequent pregnancies. Goodall stated that he had observed 5 cases of "true" chronic nephritis in which cure followed pregnancy. After their condition had been diagnosed as "chronic nephritis," the patients became pregnant against advice and, after one or two pregnancies, became free from high blood pressure, urinary albumin and urinary casts. In 1936 Peckham (82) added another contribution to his excellent follow-up studies of cases of pre-eclamptic toxemia. In this paper he stated that frequently one or two years must elapse before a decision can be reached concerning the remote results of toxemias of late pregnancy. He observed that the toxemic patient most likely to be left in a normal condition after pregnancy is the primigravida and one in the relatively early years of her period of childbearing, that the toxemic condition most likely to clear up does not mani-

fest itself prior to the seventh month and only rarely before the ninth. He placed more emphasis than formerly on the general vascular involvement, and states that one year after delivery 23 per cent of 74 eclamptic patients harbored definite evidence of chronic vascular disease. Nuri added to the evidence of persisting vascular damage after eclampsia and pre-eclampsia by his investigation of the vessels of the retina many years after eclampsia. He found a larger percentage of women who had contracted vessels in this group than in a similar group of women who had not had eclampsia.

Bell wrote that a woman pregnant after eclampsia is ten times as susceptible to toxemia (recurrent in her case) as the average pregnant woman. In a comprehensive clinical and follow-up study of the total number of instances of eclampsia occurring at the Boston Lying-In Hospital over a period of twenty years, Teel and Reid noted that eclampsia is of much more frequent occurrence among neglected hypertensive and nephritic patients than among neglected patients previously normal, that the immediate mortality of uncomplicated eclampsia is much lower than it is when superimposed on pre-existing hypertensive disease or nephritis, and that among 29 patients, on whom follow-up examinations were carried out and who were known to have been healthy prior to eclampsia, none had albuminuria or evidence of impaired renal function, and only 3 had hypertension.

Contrary to the opinions of most observers, McIlroy (67) expressed the belief that chronic nephritis does not develop as a result of the toxemia of pregnancy, but that the hypertension or chronic nephritis was present before the patient became pregnant for the first time. Herrick has stated concisely the opinion which commonly obtains: "In extensive follow-up work from year to year the course and end of eclampsia, the nephroses and nephritides of pregnancy, unfold in the familiar forms of hypertensive cardiovascular disease or of true nephritis."

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beyond our reach for the purpose of prevention. Spermatozoa, once released, are not yet amenable to stipulation of route or destination.

When prevention fails, therapy begins. A second obligation is to recognize the condition promptly. If the diagnosis is made before rupture of the maternal tissues which enclose the trophoblast, and diagnosis is followed by prompt surgical removal of the pregnancy with as much of this maternal tissue as is necessary, be it tube or ovary, then the mortality rate of this otherwise serious condition decreases to a small fraction of 1 per cent. Diagnosis is exceedingly rare before the death of the fetus permits the telltale bleeding from uterine decidua, or before distention of maternal tissues gives pain. Palpation of a swollen tube or cystic ovary may offer our only clue. Unfortunately, the uterus increases in size and softens under hormonal influence during the first two months, whether the pregnancy is within it or without. Examination, then, is directed not only to this organ but to the tubes and ovaries in order to make certain that no abnormal enlargement of the latter is present. When real doubt of the normality of the annexa exists, an Aschheim-Zondek or Friedman test by a competent biologist and examination under anesthesia are indicated. If there still is doubt of the normality of the tubes and ovaries and the pregnancy test is positive, exploration is justified or vigilant observation obligatory until the possibility of ectopic pregnancy is ruled out. Diagnostic curettage for the discovery of decidua without villi was formerly recommended by some investigators. If the suspected extra-uterine tumor is not a pregnancy, it is probably an inflammatory mass and curettage is dangerous.

If the experience which assures good judgment is lacking, conservatism, maintained in proximity to an operating room, is probably the safer choice until some objective sign or subjective symptom contributes to the clinical picture.

The earliest of the symptoms are pelvic discomfort, not acute pain, and spotting. Either or both of these may occur even before the patient suspects that she is pregnant. They are usually associated, both are rare while the fetus is young, alive, and small, but are almost universally present when the fetus is dead.

Death of the fetus and chorion withdraws the hormonal support of decidual tissue, and permits a release of the bleeding mechanism, which becomes promptly active in the decidua. Death of the fetus, probably also by the same withdrawal of hormonal support of the placental site, induces separation of the chorion from the decidua in the afflicted organ. This causes hemorrhage, distention, and pain.

The differential diagnosis should depend mainly on the temperature, the leucocyte count, and the sedimentation rate. If the diagnosis remains in doubt and the pregnancy test is negative, exploration is occasionally justifiable, provided the surgeon can resist meddling with an acute salpingitis, if this be found instead of the pregnancy. Alert observa-

tion of such doubtful cases is the safer procedure for all who have not had long clinical and surgical experience.

J THORNWELL WITHERSPOON, M D

Klaften, E. The Diagnosis of Extra-Uterine Pregnancy by the Method of Transillumination, together with a Contribution on the Subject of Histiospectrography (Zur Diagnostik der Bauchhochschwangerschaft mit Hilfe des Durchlichtungsverfahrens und zur Kenntnis der Histiospektrographie) *Zentralbl f Gynaek*, 1937, p 1986

As a new expedient in the diagnosis of extra-uterine pregnancy the author discusses transillumination with the diaphanoscope. With transillumination of the abdominal cavity from the vagina there is seen an intensely illuminated, suprasymphyseal, reddish to red, shimmering area, the so-called abdominal wall-phenomenon. This symptom is characteristic for extra-uterine pregnancy and is absent in the presence of any of the inflammatory diseases of the pelvic and abdominal cavities, as well as in the presence of a normal pregnancy. The abdominal wall-phenomenon is explained as the result of a marked succulence and serous infiltration of the abdominal wall with accompanying intense hyperemia of the same. Circulatory disturbances and congestion in the region of the inferior epigastric vein are also causes. The phenomenon may be elicited even when trifling amounts of blood are found in the free abdominal cavity and from this fact it is concluded that there is no direct relationship between the extravasation of blood and the appearance of the phenomenon.

When the tubal pregnancy has been present for a considerable period, the manifestation disappears, apparently as a result of relief from the congestion and serous infiltration with the development of collateral circulatory paths.

As a second symptom there may be demonstrated, in addition to the dark-red symphyseal field, a lighted area in the lateral regions of the abdominal wall, where the blood and transudate have collected. This phenomenon is bound up with the area in the abdominal cavity where the fluids collect. It does not necessarily correspond to the side on the ectopic pregnancy, for the blood frequently collects on the opposite side.

In concluding, the author discusses the demonstration of intra-abdominal blood by the spectroscopic method, so-called histiospectrography. However, in this matter the studies of the author have not yet been concluded. The technique and apparatus are described in detail, for which the reader is referred to the original article.

(KARL KOCH) JOHN W BRENNAN, M D

Irving, F. C. The Conservative Treatment of Premature Separation of the Normally Implanted Placenta. *Am J Obst & Gynec*, 1937, 34 881

Three hundred and fifty-three cases of premature separation of the placenta are reported. In 234 of these there was external and in 119 internal hemor-

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Patterson J. The Chemical Diagnosis of Early Pregnancy. *Brit M J* 1937 2 522

The author describes a biochemical test for the diagnosis of early pregnancy which is based upon bacterial splitting of estriol glycuronide and the subsequent development of the estriol color reaction with phenolsulphonic acid.

Urines from 65 cases in which the diagnosis of pregnancy was required have been examined by the test.

In the whole series there was only one error arising from the application of the chemical test to the diagnosis of early pregnancy, so that its accuracy can be said to approach that of the Aschheim Zondek and Friedman tests. Two cases of doubtful positivity however would have required repetition one week later, while on the other hand one Friedman test had to be repeated because it gave a very doubtful reaction when the color test showed a definite positive reaction. The second biological test on a further sample obtained five days later confirmed the accuracy of the chemical diagnosis.

Most of the other tests that have been suggested as a means of diagnosis of pregnancy have had the merit of simplicity without that of reliability. With this test the reverse holds true and it leaves some thing to be desired by way of simplification. However investigation has shown that none of the steps can be sacrificed without impairing the general efficiency of the process, the only saving that might reasonably be resorted to would be to cut down to a single extraction those processes where two extractions have been adopted as the standard practice and use about twice the volume of the extracting medium. Therefore if the time and labor involved in a single test be taken into consideration it becomes doubtful whether such a technique could find general application for the diagnosis of pregnancy. However when larger numbers are concerned and measures are taken to carry out five or six tests simultaneously the method warrants more serious consideration as a practical alternative to the biological method. To carry out such simultaneous extractions all that is necessary is the construction of a mechanical shaker to hold a number of separatory funnels.

At this stage one may conveniently summarize the advantages and disadvantages of the chemical method as compared with the biological tests. In favor of the former it can be pointed out that it enables a result to be obtained in twenty-four hours whereas the most rapid of the biological tests usually takes forty-eight hours. It dispenses with animals, the upkeep of which is expensive and which are subject to marked individual variation in sensitivity to hormone injection. Moreover it can make use

of specimens that have undergone some degree of putrefaction and have become toxic to test animals.

Its disadvantages are the more laborious technique and the fact that the reactions are rather weak when the menstrual period is only two weeks overdue. There is also the possibility that the chemical test may be in general a few days behind the Friedman test in providing positive results in the very earliest stages of pregnancy. This however has not yet been sufficiently investigated.

Even though the method might not be adopted as a routine in the diagnosis of pregnancy because of its more tedious procedure, the very fact that it provides a much readier route to the approximate determination of excess of the preponderating trophogenic hormone than that by way of biological assay would seem to assure to it or perhaps some light modification adapted to larger quantities of urine a rôle of some practical importance in the field of endocrinology.

ROBERT M. GIER, M.D.

Rock J. The Clinical Aspects of Ectopic Pregnancy. *New England J M* 1937, 217, 165

Since it is universally agreed that the proper treatment of ectopic pregnancy is prompt removal of the fetus and as much of the chorion as possible the clinical aspects of this condition are mainly those of diagnosis.

Schumann states that the high average mortality rate of such pregnancies is about 4 per cent.

The causes of ectopic pregnancy may be classified as those which prevent or delay the passage of the zygote through the tube, those which offer extrinsic inhibitory facilities to the trophoblast, and those rare contingencies which permit fertilization within the follicle itself.

A common cause of delay in transit or of prevention of access into either the tube or the uterus is an anatomical change in the tube due to abnormal development or disease. This explains the frequency of such cases among those who have been exposed to salpingitis by primary infection or by instrumental abortions, therapeutic or otherwise.

Perhaps a commoner impediment to the normal migration of the fertilized ovum into the fimbria through the ampulla and isthmus and out onto the endometrium is found in a disturbance of the hormonal control of the tubal musculature. Some form of an estrogen apparently conditions the tube to a stimulating influence which evokes active coordinated motion of fimbriae and muscularis and thus induces the fresh ovum to enter and after fertilization to pass on. It is thought that any disturbance in this effect of estrogen on the tube may favor fertilization outside the fimbriae or may account for a failure of the zygote to move on.

The third group of causes those which permit impregnation within the follicle are obviously quite

plete lacerations in 4.2 per cent. The maternal mortality was found to be inferior to the average mortality of face presentations (2.1 per cent), and puerperal infections were very rare (2.1 per cent).

The general fetal mortality was 17 per cent, but 3 cases were due to dead and macerated fetuses, 1 to spontaneous abortion at the sixth month, and 1 fetus was a monster. Hence the relative fetal mortality in the author's series was 10.6 per cent. The fetal morbidity, on the other hand, was very small (4.2 per cent).

The fetal mortality in relation to the various obstetrical operations was found to be high, forceps and embryotomy had a mortality of 55.5 per cent, but the mortality in versions was nil.

The high fetal mortality was due to pelvic malformations which, even though slight, rendered the extraction of the fetus exceedingly difficult if not impossible.

Because of the high fetal mortality following obstetrical interventions by the vaginal route, the author emphasizes the value of a cesarean section in the presence of any pelvic anomaly.

RICHARD E. SOMMA, M.D.

LABOR AND ITS COMPLICATIONS

Urnes, M. P., and Timmerman, H. J.: Breech Delivery. *J. Am. M. Ass.*, 1937, 109: 1616.

The fetal mortality of 346 breech presentations occurring in 336 patients delivered at home compares favorably with that in reports of recent hospital series.

Parasacral anesthesia for breech extractions is preferable to ether anesthesia, since in the series presented, the fetal mortality was slightly lower and the incidence of maternal complications definitely lower when it was used. It possesses the added advantage that its use does not require the presence of a skilled anesthetist in addition to the operator, and it may be used in cases of toxemia or pulmonary complications.

Pudendal block anesthesia is particularly adapted to spontaneous delivery with episiotomy and forceps to the aftercoming head. It produces no relaxation of the uterus, so that the serious complications of

post-partum hemorrhage and manual removal of the placenta will not occur as frequently as with the use of ether. Contra-indications to the use of local anesthesia for extractions, or even for the simpler operations, are threatened rupture of the uterus, severe fetal asphyxia, and inflammatory lesions of the perineum.

CHARLES BARON, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Colebrook, L., Purdie, A. W., and Others: The Treatment of 106 Cases of Puerperal Fever with Sulphanilamide. *Lancet*, 1937, 233: 1237, 1291.

One hundred and six patients with puerperal sepsis were treated with sulphanilamide, administered usually by mouth alone. One hundred of them were infected with hemolytic streptococci, belonging to Group A Lancefield in 92 cases, 3 were infected with anaerobic streptococci, and 3 with staphylococci. The clinical course of the 100 cases infected with hemolytic streptococci was on the whole similar to that of the 64 cases previously treated by sulphamidochrysoidin and P.S., although resolution of the infective process seemed a little less spectacular. The average stay in the hospital was nineteen and seven-tenths days as compared with thirty-one and three-tenths days in 1935. There were 8 deaths among the 100 cases, but only 3 of them can be regarded as directly due to the sepsis, they occurred in patients who lived long enough for chemotherapy to have a fair trial.

The mortality rate for all patients (199) infected with hemolytic streptococci since the beginning of 1936, when treatment with sulphamidochrysoidin and P.S. was begun, was 5.5 per cent as compared with the average of 22.8 per cent for the preceding five years. The significance of this change is discussed. "Drug fever" was suspected in several instances. Some degree of cyanosis developed in 58 cases and was usually associated with methemoglobinemia and sulphhemoglobinemia. Other toxic manifestations of the drug observed much less frequently included prostration, paresthesia, headache, visual disturbances, and joint pains. No generalized rashes developed.

J. THORNWELL WITHERSPOON, M.D.

rhage Among 170 patients with external hemorrhage who were delivered through the pelvis by simple means there were no deaths In 30 cases of external hemorrhage treated by cesarean section the death rate was 3.3 per cent Among 69 patients with internal hemorrhage delivered by cesarean section the death rate was 14.5 per cent In 34 cases of internal hemorrhage treated by conservative measures the mortality was 2.9 per cent Conservative measures gave a better prognosis for the mother in both types of premature separation of the placenta

EDWARD L. CORNELL, M.D.

De Snoo, K. Drinking by the Child in the Uterus
(Das trinkende Kind im Uterus) *Monatsschrift f. Geburtsh. u. Gynäk.* 1937 103, 88

That the child drinks the amniotic fluid has long been known When a hydramnion corrects itself it is to be attributed to the child's drinking more of the liquor amni than is produced A decrease in the amount of fluid may be attained by sweetening the liquid content of the amniotic sac with 80 c cm of a solution of 50 saccharin tablets intra amnially This results on occasion in the reduction of a hydramnion The saccharin may be discerned in the blood of the umbilical cord and in the urine of the child and further it may be demonstrated in the urine of the mother This proves the transference of the saccharin containing amniotic fluid through the placenta to the mother's organism An indirect proof that the artificially introduced saccharin traverses in turn the gastro intestinal tract, the blood stream, and the kidney of the child and is in part transferred through the placenta to the maternal organism could be adduced in a case of atresia of the esophagus In this case hydramnios was present and the excess fluid did not disappear following sweetening with saccharin as the child was unable to drink

In other cases tests were made using intra amniotic injections of methylene blue 50 c cm of water and 300 mgm of methylene blue In a short while the mother excreted blue green colored urine Since methylene blue cannot traverse the fetal membranes the child must have drunk the colored amniotic fluid The fluctuations in the excretion of the dye seem to indicate that the child does not drink continuously considerable periods of drinking alternating with periods without drinking probably during sleep of the child in utero The methylene blue test may also be used to judge whether the child is living or dead except in cases in which the child is unable to swallow as in anencephalus or atresia of the esophagus

In reference to hydramnion and uniovular twins the following additional conclusions were also made from these studies

The child in cases of hydramnios drinks amniotic fluid with methylene blue in large amounts at least 1 liter per day These large amounts are not excreted through the kidneys of the child as only traces of the dye could be demonstrated in the bladder urine In the case of twins the fluids from the

one twin are not transferred to the second as in the latter no traces of methylene blue could be found The question What becomes of the swallowed liquor amni in so far as it is not resorbed by the fetal body? may be answered by the statement that the liquor amni is either excreted through the amnion back into the amniotic cavity or passes over through the placenta to the mother's body In the latter instance the loss of water is made good again by the first twin in that its blood passes to the second and is replaced by fluid from the mother's circulation

It seems now to have been established as a fact that the volume of amniotic fluid is determined by the functioning of the amniotic epithelium together with the amounts drunk by the child Normally nature maintains an equilibrium between the amounts produced and the amounts resorbed in the interest of the stability of the cephalic position of the child in utero and of protecting the child and the umbilical cord from pressure

(H. FUCHS) JOHN W. BRENNAN, M.D.

Casparri, F. A Clinicostatistical Study of Face Presentation (Della presentazione di faccia contributo clinico statistico) *Ginecologia* Torino 1937 3, 837

After having reviewed the literature on this subject Casparri presents a clinicostatistical report of cases of face presentation observed in his clinic over a period of ten years

The author found that face presentation occurs in about 0.5 per cent of the cases The most frequently observed presentations are right mento-posterior and left mento-anterior Less frequent presentations are right mento-anterior and left mentoposterior

In the majority of cases face presentation occurs spontaneously regardless of the position of the presenting part but more frequently in anterior than posterior positions

The duration of labor as far as dilatation of the cervix and expulsion of the fetus are concerned is longer than in vertex presentations and this is true especially in primiparas

Early rupture of the membranes occurs with a frequency of 33.33 per cent The total duration of labor in these cases was found to be markedly prolonged The average duration of labor was twenty-five hours and forty minutes whereas in cases with late rupture of the membranes the average duration was twelve hours and forty-five minutes

The duration of the third stage of labor was physiological in 97.9 per cent of the cases and the blood loss was in all cases within normal limits

In 21 per cent of the cases labor was terminated operatively Forceps application was most commonly used in 14.8 per cent Embryotomy was performed in 4.2 per cent of the cases and version in only 2.1 per cent of the cases

Vaginal perineal tears occurred relatively frequently 12 in 37 per cent of the cases and com-

of Berlin in 1891. It is to be distinguished from multiple cortical miliary abscesses and from solitary large abscess of the kidney. It is a well circumscribed lesion which projects from the surface of the kidney like a tumor. On section it presents a striking carbuncular appearance, showing numerous pockets of thick staphylococcal pus, in the midst of a more or less dense fibrous-like tissue. The authors' study is based on 3 cases of their own, plus 65 cases collected directly from the French and foreign literature. Others have reported larger series, so that a total of about 110 or 120 cases have been reported in the world literature. The authors included only cases in which they were able to read the original report and were convinced of the correct diagnosis.

Carbuncle of the kidney occurs as a metastatic involvement of the kidney in the course of staphylococcal septicemia or pyemia, although the original septicemia may have been mild or even unrecognized. The condition is apparently rare, occurs most commonly between the ages of twenty and forty years, it predominates in the male sex. It may occur as a distant complication of such conditions as furunculosis, carbuncle of the neck or elsewhere, simple abscess, tonsillitis, and infected wounds. Trauma to the kidney may be a predisposing factor.

Anatomically the lesion may be localized or it may be massive and occupy almost the entire kidney. It is usually single, but may be multiple in one or both kidneys. Of the 68 cases here reported 7, or 10.2 per cent, were bilateral. The perirenal tissues may be normal or there may be a perinephritic phlegmon, or even dense fibrosis in long-standing cases. Twelve of the 68 cases had other associated extrarenal metastatic complications, as pericarditis, parotiditis, osteomyelitis, and empyema. Carbuncle may be associated with perinephritic abscess.

Histologically, in the early stage, carbuncle of the kidney shows numerous small collections of neutrophilic leucocytes, surrounded by an area of edema, fibrosis, and granulation tissue. Later there develop 3 distinct zones. (1) a peripheral zone of renal tissue showing marked inflammatory reaction, with plasma cells and leucocytes in the enlarged convoluted tubules, in the interstitial tissue, and within Bowman's capsules, (2) a middle zone composed of fibrous tissue and capillaries, infiltrated with leucocytes; (3) a central zone of fibrous tissue poorly stained, with many staphylococci and remnants of glomeruli and tubules.

Clinically, the most typical case is that of a person who has recently had some type of staphylococcal infection who suddenly develops high fever, signs of toxemia, indefinite lumbar pain, and costolumbar tenderness. Fever persists, together with prostration. Only after some time does the kidney become enlarged and pus appear in the urine. The blood culture is rarely positive. Very often a perinephritic abscess appears. In occasional cases, the entire course of the disease is subacute or chronic.

The diagnosis is rather difficult. On the basis of the signs and symptoms just given it could be sus-

pected. Ureteral catheterization with separation of urine from the two kidneys may be helpful. Pyelographic changes are present in about 85 per cent of the cases. If perinephritic abscess develops, this condition may cause the clinician to overlook the underlying carbuncle of the kidney.

Medical treatment consists of general supportive measures plus vaccine therapy, serotherapy, and staphylococcal antitoxin. Chemotherapy seems to be of no value. Although the other measures are of doubtful value, they may help in some cases, and because of the persistence of bacteremia in some cases after operation, the authors advise that they be continued after surgical intervention.

Surgical treatment consists either of nephrectomy or of some more conservative procedure. In massive carbuncle, and in some other cases nephrectomy must be done. Forty-two cases in this series were treated by nephrectomy. The conservative procedures reported in this series are as follows:

1 Simple incision of perinephritic abscess with no direct attack on the carbuncle. Eight cases, among these there was 1 death, 7 nephrectomies were performed with 4 subsequent deaths.

2 Incision of the renal capsule and drainage in contact with the carbuncle. Two cases with no deaths.

3 Decapsulation, incision of the carbuncle with the thermocautery. Three cases, no deaths.

4 Excision, avulsion, or curettage. Eight cases with no deaths.

5 Resection. Four cases and no deaths.

6 Enucleation along a cleavage plane. Six cases with 1 death.

The results of nephrectomy were as follows: 34 immediate nephrectomies with 5 deaths, a mortality of 14.7 per cent and 8 secondary nephrectomies with 4 deaths, a mortality of 50 per cent, which makes a total of 42 with 9 deaths, and a total mortality of 22 per cent.

The results of conservative operation varied greatly as regards duration of convalescence, complications, and final result, but in general the mortality rate was lower than after nephrectomy, except in the cases of primary incision of perinephritic abscess followed by nephrectomy. The authors quote the mortality statistics of others, which are in general comparable to theirs. They conclude with careful résumés of their 3 cases, together with abstracts of the other 65 cases they have reviewed.

M. M. ZINNINGER, M.D.

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In general, surgical treatment should be advised for primary calculi, unless they are so minute that they may pass spontaneously. The absence of pain or urgent symptoms is no excuse for advising against operation. If the stone is not removed, renal damage is progressive to a greater or less extent in the majority of cases and operation often ultimately

GENITO-URINARY SURGERY

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Rolnick states that the true capsule of the kidney acts as a protective barrier to trauma and resists the spread of infection to the organ. There is a constant interchange of fluid on the kidney surface which may be of considerable clinical and physiological importance. This fluid lubricates the kidney and allows for the constant finding of a plane of cleavage between the capsule and the kidney.

Rolnick believes that decapsulation is harmful to the kidney for the new capsule which forms later consists of scar tissue only and contracts and compresses the kidney. These actions interfere with the changes in intrarenal tension and also prevent an interchange of fluid from its surface. Thus decapsulation should not be done routinely at operations as is practiced by some surgeons.

HENRY L SANFORD M D

Coutts W E Banderas T and Canlin F The Renal Syndrome Due to the Presence of 6 Lumbar Vertebrae (Contribution à l'étude des syndromes rénaux causés par l'existence de six vertèbres lombaires) *J d urol méd et chir* 1937 44 467

Coutts and his associates note that although much progress has been made in urological diagnosis in recent years there are some clinical syndromes of lumbar pain due apparently to prerenal or pararenal conditions the cause of which is still obscure. The kidneys are thoracic abdominal organs and extra-peritoneal their normal mobility is slight and their anatomical integrity depends upon intra-abdominal pressure and perhaps also upon the bony and muscular configuration of the body more than is the case with other organs.

In the last few years the authors have observed 4 women in whom urological symptoms were associated with an anomaly of the lumbar vertebrae: in all these women there was a sixth lumbar vertebra present, as demonstrated by a careful roentgen study of the whole spinal column.

In relation to the bony framework the kidneys are normally placed in the angle of the eleventh rib and the outer border of the spinal column the crest of the ilium is below them. In general the kidneys lie at the level of the last dorsal and first two lumbar vertebrae the right kidney is somewhat below the left kidney and the kidneys in women are at a lower level than in men. The twelfth rib shows much variation it may be entirely absent or very short. If the rib is long it extends in an oblique direction from the spine, if short it extends horizontally. The eleventh rib shows very little variation.

If a supernumerary lumbar vertebra is interposed below the last dorsal vertebra the upper part of the

kidney is at the level of the second lumbar vertebra and the kidney appears to be displaced downward it can also be palpated over a larger extent than normally. If the supernumerary lumbar vertebra is interposed between the last lumbar vertebra and the sacrum the kidneys retain their normal relationship to the lumbar vertebrae, but the ureter is elongated. With the first type of vertebral anomaly the kidneys become abdominal rather than thoracic abdominal organs.

In making roentgenograms of the bony structure of women with renal symptoms the authors have measured four diameters forming a quadrilateral. These diameters are (1) from the center of the upper border of the first lumbar vertebra to the center of the upper border of the first sacral vertebra (2) from the center of the upper border of the first lumbar vertebra to the inferior posterior spine of the ilium (3) from the superior posterior iliac spine to the center of the upper border of the first sacral vertebra and (4) from the inferior posterior spine of the ilium to the center of the lower border of the twelfth rib if the rib is long or to the distal extremity of the eleventh rib if it is short. In the cases of 55 women with 5 lumbar vertebrae in which roentgenograms and measurements were made 47 had a long twelfth rib and 8 a short twelfth rib. The diameters that were of the greatest interest in this study were found to be (1) and (4). In the 47 cases in which the twelfth rib was long the diameter (1) was from 17 to 18 cm in 75 per cent of the cases the diameter (4) varied from 12 to 13 cm being 14 cm in 42.5 per cent of the cases. In the 8 cases with a short twelfth rib the diameter (1) was 16 cm in 50 per cent of the cases and the diameter (4) was 13 cm in the same percentage of cases. However in 4 women with 6 lumbar vertebrae the diameter (1) was greater than 20 cm from 20.8 to 26 cm and the diameter (4) varied from 13.5 cm to 17 cm.

In 2 of these 4 cases the interposition of the sixth lumbar vertebra was of the sacral type both patients complained of attacks of lumbar pain which in one was increased by movement. In these cases the symptoms must be attributed to the elongation of the ureter with the resultant tendency to relaxation and abnormal curvatures. In the other 2 cases the interposition of the supernumerary lumbar vertebra was of the cranial type the kidneys were in the abdomen and easily palpable. In this type the symptoms are due to the low position of the kidneys as they are deprived of their costal support and more exposed to injury.

ALICE M MEYER

Gibert J and Klatzman H Carbuncle of the Kidney (L'anthrax du rein) *J d urol méd et chir* 1937 44 273 353

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ALICE M MEYERS

Gibert J and Klajman H Carbuncle of the Kidney (L'anthrax du rein) *J d urol méd et chir* 1937 44 373 353

Carbuncle of the kidney is a rare variety of staphylococcal pyonephritis first described by J.rael

as a result of this, or because of a hypoplasia of its proper renal mass, finds a junction with the opposite one. The degree of fusion, when it occurs, is very variable, and between complete fusion and complete separation into two isolated kidneys, all degrees of transition are found. One may assume that the renal blastema of the one side is divided into two kidneys, each with its ureter. This theory would explain the almost constant hypoplasia of the crossed ectopic kidney, in that it has available only a portion of the nephrogenic cap on the side with which the ureter has made a junction.

In discussing the second case, a malignant leiomyoma, the author says that it is fair to assume that some of the primary tumors of the kidney that have been described as fibrosarcomas are not tumors that have arisen from fibroblastic cells, but from smooth muscle cells, and they are really leiomyomas.

The differentiated cells in this malignant leiomyoma are spindle-shaped and resemble cells of fibroblastic origin, and the tumors would have been called fibrosarcomas if the material had not been properly fixed and stained with differential stains. As a result of proper fixation of the fresh material and the use of differential stains, we have been able to demonstrate myoglia fibrils within the cells of this tumor, a finer histological structure than is found in smooth muscle cells.

In going over a comparatively large series of tumors removed in the Montreal General Hospital, the author was impressed with the fact that a fair percentage of the tumors that under ordinary circumstances would have been diagnosed as fibromas or fibrosarcomas, when properly fixed and carefully studied, were found to be smooth muscle tumors.

The third case was a malignant papilloma growing in an old hydronephrotic sac. The author states that in this case the hydronephrosis was caused by a kinked and tortuous ureter close to the renal pelvis and was apparently due to a periureteritis in one of the loculi of the hydronephrotic sacs, where the tumor had taken origin. J SYDNEY RITTER, M D

Heitz-Boyer: Surgical Drainage of the Kidney, Transrenal Inferior Longitudinal or Inferior-Pole Drainage. (*Drainage chirurgical du rein, le drainage transrénal longitudinal inférieur ou polaire inférieur.*) *Mém l'Acad de chir, Par, 1937, 63, 1102*

The following four main considerations should be met in surgical drainage of the kidney:

1. Removal of the urine secreted by the kidney at the most dependent point
2. The escape of clots, debris from calculi, and purulent material
3. Assurance that the cavities of the kidney remain empty and, if infected, intrarenal lavage with antiseptic solutions
4. Maximum comfort to the patient and easy change of dressings

The author believes that his technique, which he calls transrenal, inferior longitudinal drainage or

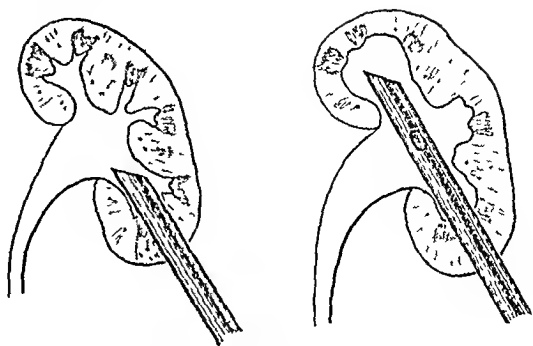


Fig 1 The two different positions of the end of the drain inside the kidney. On the left, the intrarenal cavities being only moderately dilated, the drain is inserted only into the pelvis, on the right, the superior calyx being quite dilated, the end of the drain is drawn up into it, in order to better evacuate and disinfect it.

lower-pole drainage, meets all these requirements. The accompanying illustration (Figure 1) shows diagrammatically how the drain is placed. The technique is simple. It implies previous pyelotomy for the removal of calculus, or for partial resection of the pelvis. Through the pyelotomy incision a curved clamp is introduced into the lower calyx and its point pushed down into the lowermost part. From there two techniques are possible:

1. A clamp with blades closed is inserted through the renal tissue from outside the lower pole, until the tips of the two clamps meet. The two blades of the outer clamp are then spread, creating a tear in the renal tissue, which bleeds very little. The drain is then inserted through this defect.

2. The defect in the renal tissue can be made with an electric knife, the clamp inside the lower calyx serving to guide the direction of incision. A tunnel is made in this way, and bleeding is controlled by electrocoagulation. The drain inserted from without is pulled into the pelvis by the clamp inside. Any rigid or semi-rigid rubber tube may be used, although the author makes use of a special model which he has had made. The end should be cut diagonally and an eye should be cut at a lower level. The size of the tube should vary and depend on the size of the pelvis and calyces, which can be determined by previous pyelography. Usually 25, 30, or 35 F is used. The upper extremity of the drain may be placed in the lowermost calyx or may be carried up into the superior calyx with an eye in the tube in the lower calyx. After the drain is precisely placed it is immediately fixed at its point of emergence from the lower pole by a catgut suture in the capsule, also to the lips of the cutaneomuscular incision so that in the postoperative phase there is no danger of the tube's being pulled out of the kidney. The pyelotomy incision is then closed.

This method of drainage is indicated in most cases of nephrostomy for almost any cause, but is especially desirable in cases of conservative surgery for in-

becomes imperative. If operation is postponed until this time, the chance for performing a conservative operation and preserving the kidney is certainly reduced. If for any reason a given stone is not removed soon after its presence is detected, the importance of careful periodic urological examination cannot be overestimated. Under close observation of this type of case it may be safe occasionally to treat certain patients with nephrolithiasis medically. Changes in the size of the stone, the pyelographic observations, renal function and other important factors can then be detected early and the proper treatment can be instituted before the kidney has been damaged too severely. Excretory urography will usually supply the pertinent data in such cases.

Although many of the patients who had large, bilateral branched calculi survived some years with out evidence of serious difficulty, in almost every case grave symptoms developed sooner or later and very few of them were living ten years after the stones were first discovered. In some cases small calculi associated with large branched stones became dislodged and occluded the ureter. Damage to the renal parenchyma was progressive so that ultimately the renal reserve was greatly depleted and operation or any intercurrent excessive demand on renal function carried a very high risk. Destruction of the kidneys was often slow and during the ensuing years the patient may have enjoyed comparative comfort while resting under a sense of false security. The authors do not mean to imply that every patient with bilateral branched stones should at once be operated on, however the general policy of early conservative operation certainly seems advisable in most cases as the ultimate prognosis is bad if the stones are not removed. With the current improvements in surgical procedures and postoperative treatment the risk of operation in cases of this type has been definitely reduced and the chance of preserving a functioning kidney correspondingly enhanced. Obviously if operation is to be performed the optimal time is prior to the development of renal insufficiency.

One is often asked by the patient who has a renal stone that has caused few if any symptoms. What are the chances for future trouble if the stone is not removed? Although there are of course, no absolute criteria by which this question can be answered certain factors are of importance in attempting to estimate the likelihood of subsequent symptoms. The more important factors in this regard are as has been said the history of pain whether the stones are unilateral or bilateral whether or not they are recurrent the size and position of the stone or stones within the kidney the pyelographic appearances the function of the kidney in question and the amount and nature of the infection present. In general, the stones which are least likely to cause trouble are small (1 cm. or less) have not previously caused pain and are situated in a calyx of a normally functioning uninfected kidney which shows no pyelographic abnormality. In contrast stones which in all probability will cause definite trouble are those

which have already caused pain, are larger than 1 cm. in diameter, and are situated in the pelvis of an already damaged and infected kidney. With these factors in mind the advice regarding the advisability of early operation may be influenced accordingly.

One hundred and seventy seven patients who had nephrolithiasis but who were not operated on at the time diagnosis was established were followed for an average of eleven years to determine their subsequent clinical course.

It was noted that (1) 81.8 per cent of all unilateral stones and 97.8 per cent of all bilateral stones that were not removed surgically caused further symptoms referable to the urinary tract (2) silent stones caused subsequent symptoms less frequently (in 66.3 per cent of the cases) than stones which had previously caused pain (in 95.6 per cent of the cases) (3) large stones caused subsequent symptoms and necessitated later operation more frequently than small stones (4) stones in a calyx caused subsequent trouble less often than stones in the pelvis and this was true especially of stones in the tip of a calyx (5) a kidney which contained a stone but which was normal pyelographically caused serious symptoms less frequently than a kidney which was definitely abnormal pyelographically, (6) impairment of renal function increased the likelihood of serious symptoms and the necessity for subsequent operation and (7) the presence of gross infection in association with stone definitely increased the incidence of subsequent symptoms referable to the kidney.

Bailey O T and Harrison I H. Large Benign Renal Neoplasms. Their Pathology and Clinical Behavior with a Report of 5 Cases. *J Urol* 1937 38 509.

The authors present the case histories and local pathological findings in 5 cases of benign tumor of the kidney. The majority of the symptoms are caused by the pressure of the mass on adjacent viscera. Hematuria was the primary symptom in 4 cases. Roentgenographic studies were of primary importance in the differential diagnosis from malignancy, enlarged spleen, retroperitoneal neoplasms, hydronephrosis or pyonephrosis and cysts of the mesentery, ovary, or pancreas.

The operations were performed by the transperitoneal method. DONALD K. JONES, M.D.

Patch F S. Three Unusual Primary Kidney Tumors. *Brit J Urol* 1937 9 339.

The author reports 3 very interesting cases of kidney tumor. The first was a carcinoma in a crossed heterolateral ectopic kidney without fusion. The pre-operative diagnosis of this condition was exceptionally rare prior to 1908. In his discussion of the cause of this anomaly the author refers to Pagel who states: These are almost without exception limited to parts derived from the Wolffian and Mullerian ducts. He advances the view that a crossed ectopia arises through the budding of one ureter toward the wrong side, and that the ureter

The adhesions around the epididymis are then freed. The dissection of the epididymis from the testicle is then started, not at the head or tail, but in the middle of the body. The vaginal recess of Poirier is identified, and while the assistant exerts traction on the cord to hold the vessels out of the way, the points of a pair of straight Mayo scissors are inserted into this recess, kept close to the epididymis, and forced through into a cleavage plane in the spermatic cord. Two catgut ligatures are now passed around the body of the epididymis on each side and the epididymis is divided with the electrocautery or thermal cautery between the ligatures and the cut ends are carefully cauterized. This separation of the epididymis into two portions exposes the vascular supply to the testis, the epididymis and the structures of the cord. This vascular supply with its various abnormalities is described in detail. The maneuver described is said to give excellent exposure so that the branches going to the two parts of the epididymis can be seen easily and ligated without damage to any other vessels. Each half of the epididymis is then separately dissected from the testicle, the vas divided very high, usually near the internal inguinal ring, and finally the scrotal ligament is divided. The wound is closed completely by two rows of sutures without drainage.

M M ZINNINGER, M D

Dahl-Iversen, E, and Starup, U.: *The Treatment of Undescended Testicle with Gonadotropic Hormone* (Die Behandlung der Retentio testis mit gonadotropem Hormon) Hosp-Tid, 1937, p 657

A summary of the results of the hormone treatment of undescended testicle is presented according to the published reports submitted by 19 authors. In all, 265 patients were treated. In 208 cases exact statements were made as to the results obtained in 129 cases (63 per cent) there was complete descent and associated development of the testicle, in 25 cases (12 per cent) improvement was noted, that is, a partial descent with development of the testis,

in the remaining 54 cases, the results were designated as poor as the testicles remained in their abnormal position. In the last group of cases some of the patients were comparatively advanced in age, from twenty to thirty years, and others had been operated upon previously without success. The age of from twelve to fifteen years is said to be most suitable for this treatment.

The following hormone preparations were employed (1) those obtained from the urine of pregnancy, pregnyl (organol), follutein, antuitrin, (2) hypophyseal preparations, prehormone, prephyson and autex, (3) tablets or suppositories of prepitane, a dried hypophyseal substance, and (4) testicular preparations, testosan forte and androstin. No appreciable difference could be found between the results obtained with preparations made from the urine of pregnancy and those obtained from preparations made from the hypophysis. The testicular preparations were more effective when administered by injection than when given by mouth. A certain danger in the hormone treatment of undescended testicle is the premature development of secondary sex characteristics in boys otherwise normal in their physical development. Probably treatment should not be recommended before the beginning of puberty.

Hormone treatment is contra-indicated when there is a true ectopy of the testicle, when hernia and hydrocele are present, or when fixation of the testicles has occurred, and, finally, when malignancy is suspected.

If hormone treatment fails, operation seems to be indicated. After the operation, hormone treatment may be resumed to promote development of the testicle.

The authors report their own experiences with hormone therapy. They employed preferably a luteinizing hormone, expecting from this hormone an especially favorable effect upon the Leydig cells, which are believed to play the most important part in the descent of the testicles.

(HAAGEN) J M SALMON, M D

sected calculi and large hydronephroses. It insures adequate drainage, allows lavage of the pelvis, prevents urinary leakage through the wound, and can be kept in position for a considerable period up to forty or fifty days. By pyelography through the tube, complete healing of the pyelotomy incision can be determined. It is often combined with the use of an indwelling ureteral catheter so that lavage can be made from either the large tube in the inferior pole or through the ureteral catheter.

It is particularly adapted to the author's conservative operation for large hydronephrosis. This operation consists of partial excision of the enlarged pelvis, freeing of kinks in the ureter if present, elevation and suspension of the kidney with rotation so that the kidney occupies a more or less horizontal plane with the ureter and leaves the pelvis at the most dependent point. The lower pole drainage is instituted and the pelvis closed. A number of pyelographic studies before and after this operation are reproduced which show remarkable improvement in the size and shape of the calyces, and bear out the author's contention that this form of conservative surgery of the kidney is well worth while.

At M ZINNENGER M D

GENITAL ORGANS

Uhle C A W and Melvin P D. Tertiary Prostatic Hypertrophy. *J Urol* 1937 38 487

The authors present a case of tertiary prostatic hypertrophy. The patient had undergone the following diagnoses and procedures:

December, 1925. Large adenomatous trilobar prostatic hypertrophy and vesical calculus. Two-stage suprapubic prostatectomy and lithotomy.

December, 1930. Inflammatory contracture of the vesical sphincter and suprapubic fistula. Young's punch operation and excision of the fistula.

June, 1932. Large adenomatous trilobar prostatic hypertrophy and suprapubic fistula. One-stage suprapubic prostatectomy and excision of the fistula.

May 1935. Moderate adenomatous bilateral lobe prostatic hypertrophy predominantly in the right lobe and suprapubic fistula. Excision of fistula and transurethral resection. All microscopic sections showed benign prostatic hypertrophy.

The authors reviewed the literature and found the incidence of recurrence to be between 1 and 2 per cent. They ascribe recurrence to the patient who is operated upon at a comparatively early age. The adenomatous tissue is removed, but prostatic tissue is left from which further adenomas develop.

GILBERT J THOMAS M D

Barney J D. Transurethral Prostatic Resection Versus Prostatectomy. *New England J M* 1937 21 1073

The author discusses transurethral prostatic resection versus prostatectomy, presenting data obtained from the Massachusetts General Hospital on the

treatment of prostatism during the past twenty-five years under his supervision.

During 1932-60 cases were operated upon transurethraly, with rather unsatisfactory results, and the author admits that these results were due to lack of familiarity with the procedure.

Since 1933 about 200 cases were operated upon by the transurethral route with a mortality of 3.8 per cent. Though this procedure is employed in about 60 per cent of all patients operated upon for prostatism, he does not advocate its use as a prophylactic measure.

There has been a steady increase in the percentage of transurethral prostatic resections as the author and his associates have perfected themselves in the employment of this procedure. He advocates inhalation anesthesia. The mortality rate was 12.3 per cent following perineal prostatectomy, 15.2 per cent after one-stage prostatectomy, and 17.8 per cent after two-stage prostatectomy.

The author comments on the possibility of leaving portions of a carcinomatous prostate in the patient, whereas prostatectomy would have removed the entire malignancy, and reports cancer to have been present in 21 per cent of the resected specimens.

He also warns that a second resection may be necessary later on.

The author further states that he does not wish it to be understood that he is condemning transurethral prostatic resection, but wants to make it clear that this is a procedure to be undertaken only by those who are competent to perform it and are aware of its dangers. Neither the perineal nor the suprapubic operation are in the discard, but here is still another and a very satisfactory method of relieving prostatic obstruction.

J SYDNEY RITTER M D

Sutracco L A. Considerations of Epididymectomy for Genital Bacillosis (Considerations sur l'épididymectomie pour bacillose génitale). *J d'uro* 1937 44 371

In removing the epididymis for bacillary infections, great care is necessary to avoid trauma to the testis, to the cord, and to the vascular supply to these structures. The head and tail of the epididymis are in direct continuity with the tunica albuginea, but the body is separated by the vaginal recess of Poirier. The chief danger to the blood supply is in the region of the hilum of the testis, which lies under the body of the epididymis. The author describes his operation of epididymectomy as follows:

A longitudinal incision through the scrotal skin is used, unless there is an external fistula, in which case a racquet-shaped incision including the sinus opening is used. The scrotal contents are then delivered by continuing the incision more deeply into the region of the infradartol connective tissue. The incision is then continued through the vaginal membrane into the serous cavity. This may be partly obliterated, but usually some fluid-containing pockets representing its remnants can be found and opened.

either from the lower end of the radial shaft or from the crest of the tibia (Campbell has recently suggested that this graft be taken from the prominence of the distal end of the ulna. This, in itself, will tend to improve the cosmetic result.) Authors are agreed that solid bony healing should be present before the osteotomy is attempted. This will decrease the danger of fragmentation of the distal portion of the radius by the osteotome and the subsequent prying that may be necessary to restore the radius to its normal length. However, not all cases of malunion need be subjected to this open correction, as a noticeable deformity does not necessarily mean poor function. Persistent pain, marked limitation of motion, and extreme weakness of the grip, coupled with poor appearance, will justify further surgical efforts.

These afore-mentioned lesions of the lower end of the radius and ulna are common, expected, and, as a rule, recognized and treated satisfactorily. Only slightly less common and frequently unrecognized, and therefore poorly treated, is the group of fractures, dislocations, and diseases with a traumatic background which occur in the carpus, particularly in the proximal row. They continue to be a frequent source of disability in the wrist and their diagnosis, prognosis, and management are the subject of many papers and discussions.

CONGENITAL ANOMALIES

No case of congenital absence of any of the carpal bones was brought to the attention of the profession by writers during this five-year period. Frequently, however, the bipartite carpal scaphoid was discussed. Mouchet (85), Bergerhoff (7), and Watkins (144) call attention to the fact that this anomaly occurs frequently enough to confuse the issue when there is a history of atypical trauma or lack of the usual physical findings on examination of the wrist. This natural division of the bone is due to the presence of two ossification centers instead of the usual one, and the subsequent failure of fusion is made possible by the presence of the true articular cartilaginous plate between the two fragments. The opposite wrist should always be studied with the roentgen rays because frequently these lesions are bilateral. A sprain of the wrist with effusion of joint fluid or blood in the radiocarpal joint can confuse the issue in the presence of congenital division of this bone. A careful study, however, will easily enable one to distinguish between the fresh fracture and the long existing congenital separation. The principle thing to keep in mind is that the bipartite scaphoid will be smooth and even along

the edge in question, while the fracture will be less smooth and, as time goes on, will usually show a slight increase of the space from absorption before ultimate healing takes place.

This same congenital condition may possibly exist also in the semilunar bone because it, too, at times has two centers of ossification. The remaining five bones of the carpus have not been mentioned in any of the articles concerning the possibility of confusion because of this particular condition. Watkins (145) names and discusses the dozen or so small anomalous bones which may appear in x-ray examination of the wrist. They may be present anywhere between the distal end of the radius and the ulna and the proximal end of the metacarpals. Usually they are closely associated with the normal bones, and a knowledge of their whereabouts together with a close study of their roentgenographic appearance will enable one to differentiate them from the small avulsion fracture which may occur in these areas.

Practically all the eight bones of the carpus have been the subject of reports of injury or disease, but the two important bones continue to be those on the radial side of the proximal row, namely, the navicular or scaphoid, and the lunate, or semilunar. These continue to lead all others, both as to frequency of injury, and duration and extent of disability following injury.

FRACTURES OF THE CARPAL SCAPHOID (NAVICULARE)

The mechanism of injury was mentioned only in passing by some of the authors, as it is well known that fracture of the scaphoid occurs by a fall on the outstretched dorsiflexed hand. Minor variations in this principal position are responsible for the occurrence of the other common injuries about the wrist, namely, fracture of the distal end of the radius, epiphyseal separation, and dislocation of the semilunar bone. No mention was found of fracture of the scaphoid occurring with a radial fracture, but fracture of the scaphoid is not uncommonly associated with dislocation of the semilunar bone. Thompson's (135) article includes a report of a fracture of the scaphoid bone associated with one of the cuneiform (triquetrum). More than one author suggest that ulnar deviation is the practical position in which to place the hand when falling. Even after a moment's reaction, this is a likely position to assume. This position makes it possible for the carpal scaphoid to attempt to be included as a member of both rows of the carpus and, being the longest bone in the group, it is best able to do this. It is thus set in this position a moment before the impact and

FRACTURES OF THE WRIST

Five Year Review of the Literature, from 1932 to 1936

JAMES K. STACK, M.D., Chicago, Illinois

ONE of the most common injuries to the skeletal structure continues to be the fracture of the distal end of the radius, which may or may not be complicated by lines of comminution entering the distal radio-carpal joint. Displacement of the styloid process of the ulna is not an unusual associated injury. When the patient falls on the outstretched hand the intensity of the force thus applied is the determining factor from which a simple type of Colles' fracture or one with marked joint comminution will occur. Ghormley and Mroz (38) and Steindler (130) were among the few who wrote on this subject. Probably only a few articles were written because the lesion is easily recognized as a rule and the treatment is rather standardized.

Certain features about these fractures which are worthy of note are stressed by the authors. On examination of the wrist and the roentgenogram of a patient suffering from this type of injury 6 points must be kept in mind:

1 Does the fracture enter the wrist joint proper? If it does the prognosis should be somewhat more guarded than if it does not enter the joint, because injury to the joint cartilage will make the patient a more likely subject for the development of a traumatic arthritis than a patient whose joint is clear.

2 Has the distal radio-ulnar joint been disturbed? If it has the prognosis should again be more guarded because the patient's ability to pronate and supinate completely will be of longer standing than usual.

3 The dorsal displacement of the distal fragment. This displacement is responsible for the typical silver fork deformity and must be reduced if a good cosmetic result is to be obtained.

4 Dorsal tilt of the distal radio-articular surface. Since this surface normally tends to face the volar aspect of the wrist to a very slight degree any marked dorsal tilt will produce a subsequent limitation of volar flexion in the wrist.

5 Shortening of the radius. As the distal end of the radius is made up of cancellous bone it is particularly susceptible especially in older people

to impaction and shortening. Normally the distal end of the radius which is palpated at the base of the anatomical snuff box is about a quarter of an inch longer than the styloid process of the ulna. This is a good landmark for determining whether normal length has been reestablished in the reduction. If it has not and the radius is allowed to remain in this shortened position, radial deviation of the hand will occur and undue prominence will be given to the lower end of the ulna. While a small degree of this deformity will not greatly affect the function of the hand its appearance may be a source of some embarrassment to the surgeon.

6 Dysabnement in rotation of the distal fragment. This seldom occurs to a marked degree, and is probably the least important of this group of findings. It is easily seen that any great disparity in the rotation of the fragments will result in the patient's inability to perform the rotatory movements of the forearm completely.

In the literature there is noted a marked tendency toward a shorter period of absolute immobilization after these fractures. This is valuable particularly in cases of older patients and in cases in which there is noticeable damage to the contiguous soft tissues. Early removal of the plaster or early passive motion must not be allowed without great care, because in the absence of bony healing some degree of recurrence is possible. It is to be remembered that the position of function of the hand is in slight dorsiflexion and if after reduction of the fracture the hand is held in a position of volar flexion for too long a period, its usefulness will be notably impaired. Solid union is not necessary before early motion but it is necessary before the patient is allowed to get about without a protective splint.

For the old malunited fracture in which dorsal displacement of the distal fragment, marked shortening of the radius or a dorsal tilt of the articular surface has been allowed to remain operative intervention has been advised (32). The fundamental principle of all the operative procedures suggested is the correction of the two disturbed planes—the volar dorsal plane and the radio-ulnar plane. This is accomplished by means of an osteotomy and a wedge shaped graft taken

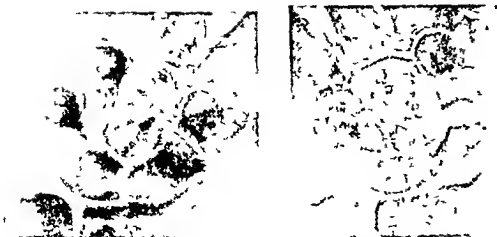


Fig 1 Variation in x-ray appearance of scaphoid caused by change in position of wrist. Ulnar deviation brings it into full view (H Luetzeler Deutsche Ztschr f Chir, 1932, 7 450)

on to non-union, the width of the fracture line may be visible even in improperly taken roentgenograms, and in those cases in which non-union has existed for years, with distortion in the shape of the bone and abnormality in size due to necrosis, it is, of course, obvious that injury or disease is present. In such cases it may not be easy to assign the cause definitely to a former fracture because the overgrowth of new bone replacing the necrotic bone may have obliterated the line, or may have united one or the other fragment to contiguous bones in the carpus. It is the common opinion, however, that post-traumatic degeneration without a fracture is much less common in the scaphoid than in the semilunar, and in the majority of cases the fracture can be found either on x-ray or operative examination.

Pathology Since the publication of the work of Preisser and Kienboeck in 1910 on the post-traumatic degeneration of the scaphoid and semilunar, respectively, interest has been aroused in the pathological changes occurring in these bones as the result of a single fracture or multiple small injuries (18, 12). In the ordinary fracture of the scaphoid, seen early and treated properly, only the minimum change, similar to that seen in any other intra-articular fracture, takes place. This consists of a mixture of blood and synovial fluid about the fracture surfaces and a variable degree of tearing of the associated soft tissues. Usually, the amount of displacement is not great, and a fine fissure may be the only roentgenological evidence of the lesion. Commonly this fracture line widens during the first few weeks following the injury, because of some absorption of the bared surface. This is followed by an uneventful union in the majority of the treated cases. This does not imply that the cartilage surface will heal as readily, nor that the bone will not be subject to degenerative changes at a later date (Preisser) (Fig II). The interposition of soft tissue is not ordinarily a factor in non-union because there is



Fig 2 Cystic degeneration of semilunar (Kienboeck) and scaphoid (Preisser)

not sufficient laxity in these parts. Interference with the blood supply of the bone is frequently spoken of, but it is likely that the constant movement of the fragments when proper immobilization has not been used is the most important factor in the failure to heal. The various theories as to the cause of necrosis and cystic degeneration will be discussed later under the heading of Kienboeck's disease of the semilunar, which it closely resembles. The studies of Luetzeler (72) on the pathology of scaphoid non-union, in which he stresses the importance of blood supply and ligamentous attachments, are worthy of note to those interested in this subject.

Treatment Boehler (9) has called attention to the fact that the treatment of this fracture need not be looked upon as nearly hopeless, as has been done in the past. He cites the astounding number of 154 cases in which the fracture united without incident. Because of the gloomy prognosis that has been associated with this injury over a period of time, there have been advocates of such radical treatment as primary excision of both fragments. In the literature of the past five years we find this mentioned, but never recommended, and it is safe to say that this radical method of treatment should be reserved for those cases in which conservative measures have failed.

Treatment of the Fresh Fracture There seems little doubt that early and prolonged immobilization is the method of choice in the treatment of this injury. We find some difference of opinion, however, as to the method of immobilization, the position of the wrist during this period, and the time necessary for healing to take place. A circu-

the tension plus the applied force causes the fracture to occur commonly at its midpoint. That a definite fracture can occur spontaneously is suggested by Feutela's (36). Belot (6) cites an unusual instance of necrosis and fracture which occurred following repeated traumatism each of an intensity probably insufficient to be responsible alone.

While no exact figures are available in the literature over this period, the incidence in males shows a marked preponderance. It is only occasionally that attention is called to the fracture in a female. Working and laboring men are particularly subject to this injury and even more important, it is in their wrists that the later serious complications are most often found. Hopkins (52) gives the interesting observation that in a group of 500 athletes observed during a twelve year period this fracture was more common than any other, including even fractures of the phalanges. No fracture of this type was reported in a child during this five year period, and since 1908, when the first such case was reported this fracture continues to be a traumatic rarity in childhood and adolescence. Gillies (40) reviews the common fractures that occur during this period of life.

Diagnosis. The clinical diagnosis of fracture of the scaphoid is mentioned frequently as it relates to both fresh and old cases. The differences between the features presented by these two types of cases are stressed. The patient with the fresh fracture presents an acutely painful wrist, and it is most important for the attending surgeon to have all the possibilities in mind. The common error made by the patient or the doctor, from which the majority of the chronic cases are derived, is to look upon the injury as a sprained wrist without the benefit of proper x ray examination (14). This leads to the fracture's being overlooked to no treatment or certainly inadequate immobilization and in many instances to non union. Speed (127, 128) calls attention to the swelling which may partially or completely obliterate the anatomical snuff box, the normal depression on the radial side of the carpus bounded by the long flexor and the long abductor of the thumb. At this site is found the point of maximum tenderness. No deformity is seen and usually it is the pain and not mechanical obstruction which may cause varying degrees of limitation of motion in the wrist joint. The patient, of course has usually volunteered the story of a fall on the outstretched hand.

In the old chronic type of case pain is the constant symptom, although occasionally the patient

will complain of the grating sensation particularly on forced movements in the extreme ranges of motion. This pain is usually spoken of as "rheumatic" and dull in type. It is occasionally referred to the thumb or upward into the forearm and arm. Usually the pain is not constant and there are varying periods of time during which little or no pain will be felt. In the older cases limitation of motion will be found on examination and this is usually based on the degree of traumatic arthritis that is present in the radiocarpal joint. Non union itself may exist for many years, and in the event that the two fragments remain viable little change will take place in the contiguous cartilaginous surfaces (83). This situation is found to exist in the wrists of those patients who are not required to do manual labor. One cannot, however, prognosticate what degree of necrosis, cystic degeneration, or traumatic arthritis will occur in any of these cases regardless of the amount of use to which the wrist is put.

X Ray Diagnosis. Jacobsen (55), Preiss (109), Torphy (136), Warfield (143), Schnek (121) and Peter (105) discuss at length the roentgen diagnosis of this injury. The gist of their writings is that in examining the wrist with the thought of a possible fracture of the scaphoid one must bear in mind that the ordinary anteroposterior and lateral views, such as are usually taken for a Colles fracture, may be inadequate for close scrutiny of the carpal bones, particularly the scaphoid. The fresh fracture of this bone is many times only a fine line with no displacement. It is usual for this fissure to become slightly widened later by the absorption of the bone cells along the fractured surfaces. Early in the treatment such an occurrence is not necessarily an indication of the development of non union. Invariably, authors writing on the subject of the x ray study of the wrist advise that additional angles be used and that pictures taken in semi pronation and semi supination are of great benefit in the determination of the presence of these difficult fractures (15). Ulnar deviation is also advised because this brings the scaphoid to its full length and does not permit its distal portion to be superimposed by the rays on the proximal portion (Fig 1). The work of Destot on injuries of the wrist remains a classic especially in this aspect of the diagnosis.

It is agreed that the altogether too common error in the diagnosis of this lesion is one of omission rather than commission. If the possibility of the fracture is considered and the proper roentgenograms are taken the fracture is not likely to be overlooked. In the neglected case which has gone



Fig 1 Variation in x-ray appearance of scaphoid caused by change in position of wrist. Ulnar deviation brings it into full view. (H Luetzeler Deutsche Ztschr f Chir, 1932, 7 450)

on to non-union, the width of the fracture line may be visible even in improperly taken roentgenograms, and in those cases in which non-union has existed for years, with distortion in the shape of the bone and abnormality in size due to necrosis, it is, of course, obvious that injury or disease is present. In such cases it may not be easy to assign the cause definitely to a former fracture because the overgrowth of new bone replacing the necrotic bone may have obliterated the line, or may have united one or the other fragment to contiguous bones in the carpus. It is the common opinion, however, that post-traumatic degeneration without a fracture is much less common in the scaphoid than in the semilunar, and in the majority of cases the fracture can be found either on x-ray or operative examination.

Pathology. Since the publication of the work of Preisser and Kienboeck in 1910 on the post-traumatic degeneration of the scaphoid and semilunar, respectively, interest has been aroused in the pathological changes occurring in these bones as the result of a single fracture or multiple small injuries (18, 12). In the ordinary fracture of the scaphoid, seen early and treated properly, only the minimum change, similar to that seen in any other intra-articular fracture, takes place. This consists of a mixture of blood and synovial fluid about the fracture surfaces and a variable degree of tearing of the associated soft tissues. Usually, the amount of displacement is not great, and a fine fissure may be the only roentgenological evidence of the lesion. Commonly this fracture line widens during the first few weeks following the injury, because of some absorption of the bared surface. This is followed by an uneventful union in the majority of the treated cases. This does not imply that the cartilage surface will heal as readily, nor that the bone will not be subject to degenerative changes at a later date (Preisser) (Fig II). The interposition of soft tissue is not ordinarily a factor in non-union because there is



Fig 2 Cystic degeneration of semilunar (Kienboeck) and scaphoid (Preisser)

not sufficient laxity in these parts. Interference with the blood supply of the bone is frequently spoken of, but it is likely that the constant movement of the fragments when proper immobilization has not been used is the most important factor in the failure to heal. The various theories as to the cause of necrosis and cystic degeneration will be discussed later under the heading of Kienboeck's disease of the semilunar, which it closely resembles. The studies of Luetzeler (72) on the pathology of scaphoid non-union, in which he stresses the importance of blood supply and ligamentous attachments, are worthy of note to those interested in this subject.

Treatment. Boehler (9) has called attention to the fact that the treatment of this fracture need not be looked upon as nearly hopeless, as has been done in the past. He cites the astounding number of 154 cases in which the fracture united without incident. Because of the gloomy prognosis that has been associated with this injury over a period of time, there have been advocates of such radical treatment as primary excision of both fragments. In the literature of the past five years we find this mentioned, but never recommended, and it is safe to say that this radical method of treatment should be reserved for those cases in which conservative measures have failed.

Treatment of the Fresh Fracture. There seems little doubt that early and prolonged immobilization is the method of choice in the treatment of this injury. We find some difference of opinion, however, as to the method of immobilization, the position of the wrist during this period, and the time necessary for healing to take place. A circu-

lar plaster cast extending from the upper third of the forearm to the base of the fingers seems to be the method of choice. There are those who advise the straight or neutral position of the wrist, but most of the authors advocate a cock up position. Some believe that moderate ulnar deviation should be included, while there are others who say that radial deviation will bring the two fragments of the fractured bone in closer approximation. All advocate that movement of the first metacarpal should be absolutely confined and some would go farther and include the proximal phalanx of the thumb. These positions are all advocated on the basis of success in their use, but no series of cases was found where one position had been pitted against another in actual trial. It is well agreed that the time of immobilization should be eight weeks or more, and that earlier motion will endanger the delicate union and lead to a re separation of the fragments and their failure to unite. It is problematical how long after the fracture has occurred this conservative treatment can be instituted with a fair hope of union.

When definite failure has occurred following proper immobilization the simplest surgical procedure designed to produce a union is drilling of the fragments (122). After preliminary exposure of the distal fragment in the region of the tuberosity a fine drill is introduced. Then under fluoroscopic control it is guided through the distal and into the proximal fragment care being taken not to carry it far enough to injure the cartilage on the articular surface of the radius. One or more such drill holes may be made. Following closure of the small skin wound, the wrist is placed in the usual position for a period of about eight weeks.

The inlay method of bone grafting of this bone (89) is accomplished in much the same fashion. Following the exposure and the drilling with a $\frac{5}{16}$ in. drill a sliver of bone of sufficient size to fit snugly into the hole is taken from the crest of the tibia and driven into the two fragments. The immobilization referred to previously is used.

The onlay bone graft (13) may also be indicated in old ununited cases in which no high degree of traumatic arthritis is present. It is accomplished by exposing the dorsal surface of both fragments and cutting a slot in each. A wedge shaped graft taken from the dorsal surface of the distal end of the radius or from the tibia is then inserted as in the inlay method. The same type of immobilization is used.

As to the question of excision as a treatment of this condition, we have those who advocate the

removal of one fragment, usually the proximal or both. It is generally conceded however, that this method should be reserved for those cases in which conservative treatment has failed and in which a painful and disabling wrist continues to be present. The greatest number of cases needing extirpation however, will fall into the group with long standing non union, together with an advanced traumatic arthritis in the radiocarpal joint. The inflammatory change may be so extensive as to have caused a union between one or the other fragment to other contiguous bones of the carpus, or to the distal end of the radius. Because of its articulation with the radius the proximal fragment of the fractured scaphoid is more often the offender than the distal fragment, and some writers are of the opinion that excision of the proximal fragment alone is the best treatment. They contend that the remaining distal fragment will continue to support the radial side of the wrist, including the two multangulars and the first metacarpal bones and in this way prevent, to some extent the radial deviation that must necessarily occur when both fragments are removed. The consensus of opinion is that once excision is decided upon the operation should include the removal of both fragments.

The methods advocated for this operation are practically all variations of a dorsal and a dorso-radial incision. The tendons on the radial side of the wrist and the sensory branch of the radial nerve are carefully isolated and retracted. Next the capsule of the wrist joint is incised. It is well to keep in mind at this time the possibility of error by mistaking the identity of the small bones that may be in the field. It is by no means impossible to remove a bone other than the scaphoid particularly if it is densely adherent or united to one of the others. Since the trapezium (multangulum majus) is the one most frequently involved in such an error it is best to locate definitely the distal articular surface of the radius or the radial styloid. The dorsal aspect of the distal end of the radius at the radiocarpal joint overhangs somewhat because the plane of the joint has a slight volar inclination. After closure of the incision immobilization only long enough to promote good healing and to control pain is advised. Motion is started as early as possible after this healing period has passed.

If the condition has been of long standing the removal of this bone will do little toward bringing about any increase in the range of motion. Because there is free intercommunication between the joints of the carpus a high degree of fibrosis has already taken place in the supporting soft

tissues, and this is the most important factor in the limitation of motion. Also, it is to be remembered in giving a prognosis of such a case that the removal of the entire scaphoid will most certainly produce a slight radial deviation of the hand, because of absence of normal support on that side.

CARPAL SEMILUNAR (LUNATUM)

In instances of acute trauma to the wrist joint the semilunar is rarely clinically fractured (41, 11, 101, 93), but it is often dislocated. Again the fall on the outstretched hand with the wrist dorsiflexed is responsible. When unaccompanied by other injuries in the wrist, the dislocation practically always takes place toward the volar aspect, brings marked pressure to bear on the nearby soft structures, and, when long-standing, causes great damage to the tendons in the carpal tunnel and perhaps to the median nerve. No instance of a dislocation toward the dorsum was found in the literature of this five-year period. Apfelbach and Scuderi (3) report an instance in which the scaphoid was fractured and the semilunar dislocated, and all the fragments were displaced into the volar surface of the forearm (Fig. III).

Diagnosis The clinical diagnosis of this dislocation is discussed by Conwell (18), Buxton (15), DeJardin and Bary (28), Dulta (33), and others, and all emphasize the two important features which this lesion presents: (1) the change which takes place in the contour of the volar surface of the wrist, whereby the normal concavity is lost and an indurated fullness is found in its place, and (2) marked limitation of flexion of the wrist. The latter is due to the actual mechanical blocking by the dislocated bone. After the lapse of a week or two there may be total absence of flexion. The impression obtained by these signs is corroborated by the roentgenogram. Warfield (143), Ernst and Roemmelt (35), stress the need for a good lateral view. It is in this view that the total or partial dislocation between the concavity of the distal articular surface of the semilunar and the convexity of the proximal surface of the os magnum (capitulum) is seen. In most instances the distal surface of the dislocated bone is found to be facing the volar surface of the wrist. In the anteroposterior view the dislocation when complete can be detected by the evident shifting of the bone toward the ulnar side of the wrist, but minor degrees of displacement can be easily overlooked.

Treatment The treatment of a fractured semilunar is not frequently discussed because of the

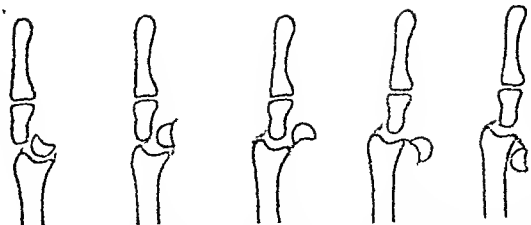


Fig. 3 The various degrees of rotation and displacement of the semilunar (Boehler Treatment of Fractures Baltimore Wm Wood & Co., 1935)

rarity of this type of fracture. Simple immobilization, with a guarded prognosis, is the treatment of choice in the early case, with excision reserved for a later time if the symptoms and changes in the bone make it necessary.

In the treatment of the dislocated semilunar, it is agreed by all writers of note that closed reduction is the method of choice if the case is seen reasonably soon after the accident. This reduction can be accomplished in one of two ways, either by traction alone as recommended by Boehler (9), or by traction plus manipulation, as done by Conwell (18).

The pressure of the volar ligament and the flexor tendons when strong traction is applied exerts a sufficient force to push the bone back into its proper position. This traction can be accomplished by grasping the hand or the fingers and exerting a slow gradual pull, while an assistant provides countertraction on the upper part of the forearm or arm. Skeletal traction may be necessary and, if so, can be accomplished by means of a pin passed through the second, third, fourth, and fifth metacarpals, with countertraction with an additional pin passed through the upper part of the ulna. If manipulation is used, the skin traction will usually suffice. The manipulating maneuver is used after preliminary stretching of the wrist. This manipulation consists of strong dorsiflexion to open further the space between the radius and the os magnum. This having been accomplished, the bone is forced back into place by pressure of the operator's thumb. By either method an audible or palpable click attests the replacement. The contour of the wrist returns to normal, and when gentle passive motion is attempted, the movement is free. In the absence of associated fracture, immobilization for a two-week period in a neutral position will suffice.

In the old cases, Boehler takes the extreme view that such a dislocation, however longstanding, can and should be openly reduced, but it seems to be the consensus of opinion that in the

old, neglected cases, or those which are irreducible, the bone should be removed (22). The longer the displacement has existed, the more deterioration will take place in the articular cartilage of the bone. Also the normal space between the os magnum and the radius will be considerably diminished by the tendency of the os magnum to approach the radius. What little space may remain will usually become filled with fibrous tissue. It is emphasized that in any attempt to reduce openly the case of longstanding, skeletal traction and countertraction will be necessary. Sufficient space into which to replace the bone cannot be obtained by hand traction or manipulation. The use of skids with which to lever the dislocated bone back into its original position produces additional damage to the cartilage, which has already been somewhat devitalized by the interruption of the blood supply to the underlying bone. In addition, other cartilaginous surfaces may be damaged in this maneuver. It would seem that in the early case such instrumental leverage is not necessary, and in the old case such instrumental manipulation should be reduced to a minimum because excessive prying will not be necessary if proper traction has been applied and a thorough debridement of the space effected.

KIENBOECK'S DISEASE

Etiology Because the opinion is prevalent that this condition has a definite traumatic background numerous articles and reports are devoted to the subject. Fitte (37), Hulten (54) and Koestler (64) discuss the etiology of this condition at great length, while Gillies quoting Riche sums up the situation very well. He has placed the workers and writers on this subject into two schools of thought: (1) those who assume fracture to be the basis of the condition, and (2) those who do not. One of three factors may be responsible for the attitude of the first group: (1) local osteitis fibrosa in the region of the fracture, (2) defective regenerative ability of the carpus, and (3) aseptic primary bone necrosis with a pathological fracture following. Those in the second group who do not assume fracture to be the cause, give the following reasons for their belief: (1) injury to the blood vessels following a momentary dislocation spontaneously reduced; (2) abnormal pressure due to anatomical anomalies [Ringsted's contribution (113) tends to sustain this theory]; (3) degeneration; (4) infection; and (5) traumatic axone reflex, in which traumatic vasoconstriction first takes place followed by vasodilatation and subsequent bone absorption. The first group is represented by Wallen-

berg, Baum, and Axhausen, while the second numbers among its members Preisser, Mueller, Destot, Fontaine and LeRiche. Quoting from Kohler, we find that he believes that the pathological process is brought about 'by the special and abnormal anatomical conditions in the carpus at the time of the injury'. The exciting factor, he thinks, is either continual small compression injuries peculiar to the occupation of the patient or one single compression injury. The course of the disease, then, runs about as follows: (1) a short stage of slight articular irritation accompanied by some pain and limitation of motion; (2) a stage of relative absence of symptoms lasting perhaps for several months; and (3) a period of definite disease as seen typically by means of the x-rays, with severe clinical manifestations.

Diagnosis Since a definite history of either a single severe compression injury or multiple small injuries cannot always be obtained, one must depend to a considerable extent upon the subjective and objective findings in the wrist. The suspicions of the examiner are aroused and the diagnosis is finally made only by means of the x-rays. The patient's usual complaint is pain and the pain ordinarily is accentuated with use. Varying degrees of limitation of motion may be present and if extreme, the grip of the patient may be weakened. On x-ray examination the typical sclerosis of the semilunar is noted. It is much more dense in appearance than the other bones of the carpus, and varying degrees of fragmentation are seen.

Treatment The only conservative treatment which is at all effective in this disease is splinting of the wrist with the hand dorsiflexed in the position of function. This can be accomplished best by means of a molded leather splint with a light aluminum support on the volar surface. This splint should extend from the base of the fingers to the upper third of the forearm. In most instances the patients are subject to periodic attack of pain and as a rule they need wear the splint only during these times. If such conservative treatment is found to be insufficient, it is the consensus of opinion that extirpation of the bone is the next resort (70, 131).

Jaroschky (57) and Wiedhopf (140) discuss the operative removal of this bone. While in dislocations because of their position, the volar approach is more satisfactory in this condition the dorsal approach seems to be generally favored. The compact structures in the carpal tunnel and median nerve need not then be disturbed and the exposure of the dorsal capsule after retraction of the extensor tendons is made

easier. As after excision of the scaphoid, early motion is indicated as soon as wound healing is complete and the pain has subsided

INJURIES TO REMAINING BONES OF THE CARPUS

Omitting severe crushing injuries of the hand and wrist, we find fractures of the bones of the carpus other than the navicular relatively rare. During the five-year period reviewed the incidence was as follows:

A Triquetrum (cuneiform)	15 (135, 103, 141)
B Multangulum majus (trapezium)	7 (31, 42, 60, 92)
C Multangulum minus (trapezoid)	1 (29)
D Hamatum (unciform) (3 of which were avulsion fractures of the unciform process)	4 (27, 34, 78)
E Pisiform	3 (30)
F Capitatum (os magnum)	3 (42, 111)

In the diagnosis of these rare injuries there is nothing typical about the mechanism of injury or the physical findings. The majority of them are found in the routine x-ray examination of the wrist, usually after various views are taken, and then only after a careful examination of the films.

Immobilization in a ventral position or, if much displacement exists, in a position favoring the approximation of the fragments, is recommended. Seldom was manipulation reduction suggested.

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SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Valentin, B.: Newer Aspects of Bone and Joint Tuberculosis (Neure Anschauungen ueber die Knochen- und Gelenktuberkulose) *Klin Wchnschr*, 1937, 2 1092

In a short historical review the author indicates that the purely conservative treatment of bone and joint tuberculosis has assumed a declining status and led to new unsolved problems. Foremost is the difficulty of diagnosis. It is of great importance to establish with reasonable certainty a diagnosis of bone and joint tuberculosis without operation. The roentgenogram is not an infallible aid, too often the films provide insufficient detail for interpretation. Studies among twins have shown that hereditary predisposition is significant for the origin and maturation of tuberculosis, it is true likewise of bone and joint tuberculosis. The importance of these considerations was demonstrated in observations among siblings of blood-related families. According to the very careful work of Johansson and Lundt it is no longer justifiable to consider as definite tuberculosis those cases which have only a strong clinical resemblance. Especially in hip and knee-joint tuberculosis the diagnosis must be left open very often. Clairmont and Stich have published similar conclusions.

From the therapeutic standpoint the patient with a painful, somewhat movable joint is in a worse condition than the one whose joint has healed in a good position and is painless even though ankylosed. The author believes that Finck's treatment of spinal gibbus deformity yields successful results in two-thirds of the cases.

In conclusion, the author stresses the need for prophylactic work in bone and joint tuberculosis, just as in the pulmonary form.

(HEINEMANN-GRUEDER) JEROME G. FINDER, M.D.

Bisgard, J. D.: Experimental Giant-Cell Tumor and Cartilaginous Exostosis of Bone. *Arch Surg*, 1937, 35 854

The author reports experimental observations on 7 rabbits in which partial or complete traumatic separation of the lower ulnar epiphysis had occurred with subsequent incomplete replacement. When growth was resumed exostoses were produced at the diaphyseal side of the cartilage plate. In 2 instances they were simply bony, in 4 others, thin cartilaginous caps covered the bony projections, and in 1 the cap was of heavier cartilage.

In 2 animals lesions similar to giant-cell tumors of bone developed, near the site of the epiphyseal displacement in 1, and near the site of operative removal of a portion of the diaphysis of the radius in another. The relation of the latter lesions to hemor-

rhage is suggested, although a possible relationship to displaced bits of cartilage is also discussed.

ROBERT PORTIS, M.D.

Davie, T. B., and Cooke, W. E.: The Supervention of Osteogenic Sarcoma in Paget's Disease. *Brit J Surg*, 1937, 25 299

The authors report the case of a woman of sixty-four who fractured her right humerus in turning over a mattress. Previous to this she had had rheumatic pains, a decrease in height, and some lumps under the scalp. The roentgenograms showed typical changes of Paget's disease in the humerus and skull, with the addition of punched-out areas resembling metastases from carcinoma.

At autopsy, the skull showed, in addition to the typical thickening of Paget's disease, several areas of bone destruction due to fleshy growths inside and outside of the skull. A fleshy tumor was found at the site of the humerus fracture, also several smaller tumors along the surface of the bone, under which the bone was softened. The hypophysis was normal, the thyroid was pale, and there was no enlargement of the parathyroids. Arteriosclerosis was found in the kidneys.

Sections of the tumors from the skull and humerus showed spindle-cell sarcoma. There were also numerous giant cells of the osteoclastoma type. There was no neoplastic new bone formation. The thyroid showed almost complete absence of colloid from the vesicles and the one parathyroid gland which was examined showed absence of oxyphil cells.

In the authors' second case roentgen-ray examination in a man of forty-two who had had pain in the legs for four years revealed Paget's disease of the spine, both bones of the right forearm, and of the skull. The appearance of the first and second lumbar vertebrae and of the forearm bones was suggestive of sarcoma. Just before death there was extreme emaciation and compression paraplegia.

At autopsy, several flattened pearly tumor nodules were found on the pleura of the right chest. All endocrine glands were examined, they showed no abnormality. In addition to Paget's disease, the skeletal system showed multiple foci of malignant disease. The largest of these sarcomatous masses was attached to the side of the lumbar vertebrae and caused erosion of the bone and compression of the cord. There were 3 in the skull. Histologically they were spindle-cell sarcomas.

The thyroid was deficient in colloid content and the parathyroid in oxyphil elements.

It was noted that in each of these 2 cases, the tumors were primary and not metastatic from any one source. Also, it was noted that the large tumors were attached to, but not growing in, the bones, and the small tumors were found embedded in the bone. Although the thyroid and parathyroid glands showed

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be the response to infection. Evidence is presented to support this theory

Eighteen new cases of reticulum-cell sarcoma and 2 new cases of generalized reticulosis are presented. All cases were verified by biopsy and 6 of them were given post-mortem examinations

One case was classified as belonging to the immature type. Nine cases were fibrillogenic, and 3 belonged to the polymorphocellular group. Three cases were not classified because of insufficient material

Photomicrographs showing detail of the structure, roentgenograms, and charts are presented, and differential diagnostic factors are discussed from a clinical view

Reticulum-cell sarcomas are regarded as extremely malignant, they metastasize early and in a generalized manner, and possess great radiosensitivity

Surgery is contra-indicated and radiation therapy is regarded as the only method from which there is any prospect of obtaining lasting freedom from symptoms. The results from radiation therapy are poor in general. Good results are dependent upon the character of the material. In general, tumors with marked radiosensitivity often give poor results with regard to permanent cure. This has proven true in radiotherapy of the reticulum-cell sarcomas

ROBERT P. MONTGOMERY, M.D.

McMaster, P. E.: The Influence of Venous Stasis on the Production of Chronic Arthritis. *Arch Surg*, 1937, 35 833

A clinical study of 30 patients presenting histories of long-standing varicose veins of the legs was undertaken to show the effect, if any, that venous stasis has on the production of chronic arthritis

In addition to varicose veins, these patients had marked congestion of the ankle and feet associated with edema, cyanosis, and eczematous skin changes. Frequently there was a decrease in the cutaneous temperature of the feet, and the arterial pulsation of the dorsalis pedis and posterior tibial arteries was diminished. Some of the patients had ulcerations on the legs of varying duration

Roentgenograms of the legs and feet were studied for signs of chronic arthritis, such as capsular thickening, marginal articular lipping, narrowing of the articular cartilage, and subchondral sclerosis, and for periosteal new bone formation of the tibia and fibula

Autopsy material of tissue surrounding and including the joint capsules of the ankles and feet was obtained in 3 cases. On gross examination this tissue was thickened as from edema and, microscopically, revealed evidence of edema, arterial thickening with some thrombosis, and an increase in fibrosis

Twenty-one of the 30 patients were men and 9 were women. The ages ranged from twenty-nine to eighty-three years and the varicose veins had been present from one to fifty years. Eighteen patients had old healed varicose ulcers and ulcerous lesions on the legs when studied. There were 5 cases in

which hypertrophic arthritis of joints other than those of the foot and ankle was demonstrated

In 21 cases there was no roentgenographic evidence of arthritis, even though in 9 of these there were varicose ulcers

In 9 cases, there was roentgenographic evidence of chronic arthritis. In each of these, there was an associated varicose ulcer, either active or healed near the ankle joint. Seven of the 9 cases had active ulcerous lesions. These all showed periosteal new bone formation involving either the tibia or the fibula or both. In addition to the periostitis, in 3 of these 7 cases there were arthritic changes in the joints of the foot and ankles. In none of these cases were there marked changes in the joints except in 1 in which there was an added "mechanical factor" from a poor weight-bearing alignment at the ankle joint due to malposition of a fractured tibia. In 1 case of very severe bilateral varicose veins, of twenty-five years' duration, with large ulcerous lesions present for several years, diffuse extensive edema of the foot and ankle, eczematous changes of the skin, and cyanosis, only minor arthritic changes were observed

The author concludes that in cases of marked venous stasis resulting from varicose veins, chronic arthritis did not develop unless it was complicated by ulcerous infection near the ankle, and then the arthritic changes were not of an advanced degree.

The author refers to experimental data from various sources as an aid in the interpretation of his clinical study. ROBERT P. MONTGOMERY, M.D.

Snyder, R. G.: The Arthritis Problem. *Med Clin North Am*, 1937, 21 1595

A serious organized effort to study arthritis was instigated by some of the leading European governments because of the enormous continued expense of treating this disease among their war veterans. There is now an American Society for the Study and Control of Rheumatism and Arthritis whose meetings serve as a center in which all available information on arthritis may be discussed and critically evaluated. Reviews of American, English, French, and German literature are made annually.

The American Committee for the Control of Rheumatism has compiled a classification of arthritis which is the best that has been devised to date.

Eighty per cent of cases of rheumatoid arthritis occur between the ages of ten and thirty years. The patients are usually underweight, flat chested, and moderately anemic. Foci of infection can frequently be found.

Osteo-arthritis (hypertrophic) is seen ordinarily in fairly robust persons past middle life who complain of a gradual increase of stiffness and pain in the weight-bearing joints. Ankylosis and deformity are comparatively rare.

The treatment of chronic arthritis is based upon routine examination and tests. A patient with low resistance should be given milder treatments than would be given to one in robust health.

abnormal features in both cases, it was thought that this may be a chance association of lesions.

Paget, in his third article reported that he found malignant disease at death in 5 of 8 cases which he followed up. One of these was sarcoma 1 probably sarcoma 2 unspecified and a were carcinoma. Although some observers doubt the etiological relationship between Paget's disease and sarcoma others contend that the onset of such an uncommon lesion as osteogenic sarcoma in such a rare disease as Paget's must have some significance. It has been noted in 11 per cent of one series of cases. In a study of 72 cases of osteogenic sarcoma in patients over fifty years old, Coley and Sharp found Paget's disease in 28 per cent. The highest percentage (46 per cent) occurred in patients from sixty-five to seventy years old and in the group between fifty-five and seventy years of age, nearly 40 per cent of all osteogenic sarcomas occurred in patients with Paget's disease. In this series 85 per cent of the patients with Paget's sarcoma were males. In 49 cases reviewed by the authors, 92 per cent were males.

As nearly as can be determined by statistics it seems that about eight years is the average time in which sarcoma supervenes after the onset of Paget's disease. Some cases have been observed as early as two years and others as late as thirty-five years. The most frequent sites are the humerus, femur, and skull. As to histological type these sarcomas are usually of the spindle-cell or mixed cell type. In a few cases the type may be that of fibrosarcoma or of osteochondrosarcoma.

Organs other than the skeletal system especially the endocrine glands have been investigated for changes in connection with Paget's disease. Diminished colloid content has been found in the thyroid but this is not regarded as being of any etiological significance. Nothing abnormal has been found in any of the other endocrine glands including the parathyroids. Blood phosphatase is usually high as many as 55 Bodansky units (normal 4 units) have been found in some advanced cases of this disease but the serum concentration of calcium and phosphorus is normal.

Paget's disease has never been produced experimentally although it has been attempted in dogs by the injection of pituitary and parathyroid preparations. The fact that bone pains have been relieved and the blood phosphatase lowered by the injection of insulin and that high phosphatase occurred in depancreatized dogs may have some etiological significance. Trauma as an etiological factor of malignant supervision seems to be eliminated nor is there sufficient evidence that the malignant onset is due to inflammatory reaction hormonal or metabolic influence.

The prognosis is bad. The average duration of life after the appearance of the sarcoma was eight months in Bird's series of 9 cases. In another series of 31 cases all but one terminated fatally within a few months.

Intensive radiation may be effective in relieving pain in the terminal stages of the disease.

WILLIAM ARTHUR CLARK M.D.

Edling L. Contribution to the Pathology and Clinical Picture of Reticulum Cell Sarcoma. *Radiology* 1938 30 19.

The name reticulum cell sarcoma has been selected for these affections of the reticuloendothelial system because the reticulum cells do not overlie a preformed reticulum but form a cytoplasmic reticulum themselves. This cellular reticulum formation is an important differential factor in the microscopic study of these and other tumors of the upper air passages. The reticulum cell sarcomas are derived from the reticulum cells of the lymphatic tissue and not from the lymphatic cells like the lymphocytomas.

The reticulum-cell sarcomas are divided into 4 groups.

- 1 The immature undifferentiated or primary type of tumor is built up of a uniform syncytium of large pale, round and polygonal cells anastomosing with each other through abundant strands of cytoplasm. The cells have a large bulb-shaped nucleus, with finely divided chromatin, a distinct nucleolus, and a sparse cytoplasm often containing numerous droplets of fat.

- 2 The mature forms are characterized by the tendency of the tumor cells to develop fine fibrils which arise within the plasma but with tumors of a higher degree of maturity these fibrils are seen to enclose the cells of the syncytium as a wide branching network. In the early stages this fibrillar network becomes apparent only on staining with silver but with greater differentiation it can in part assume a collagenic character. The youngest portions within the syncytium the centers of proliferation appear as areas more or less free from fibrils. It is impossible to draw a sharp histological line of differentiation between the types of reticulum cell sarcomas. This necessitates a classification that considers the predominant morphological characters of the cells.

- 3 The polymorphocellular type is characterized by extremely varying forms of cells round polygonal or highly irregular often connected with each other by protoplasmic offshoots, so as to form continuous syncytias. The cells frequently develop into phagocytes. There are often numerous giant cells with lobed or fragmented nuclei. Differentiation of the fibrils which is susceptible to silver staining occurs but this is not a predominant feature.

- 4 The associated or combined forms are those in which the blastomatous process in the reticuloendothelium is combined with pathological proliferation of other cellular elements such as leucemia or lymphogranulomatosis.

The author believes that the theory of specific lympho-epithelium is inadequate as an explanation of the etiology for the reticulum-cell sarcomas and other closely associated tumors of the reticuloendothelial system. This type of cell infiltration may

be the response to infection. Evidence is presented to support this theory.

Eighteen new cases of reticulum-cell sarcoma and 2 new cases of generalized reticulosis are presented. All cases were verified by biopsy and 6 of them were given post-mortem examinations.

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Photomicrographs showing detail of the structure, roentgenograms, and charts are presented, and differential diagnostic factors are discussed from a clinical view.

Reticulum-cell sarcomas are regarded as extremely malignant, they metastasize early and in a generalized manner, and possess great radiosensitivity.

Surgery is contra-indicated and radiation therapy is regarded as the only method from which there is any prospect of obtaining lasting freedom from symptoms. The results from radiation therapy are poor in general. Good results are dependent upon the character of the material. In general, tumors with marked radiosensitivity often give poor results with regard to permanent cure. This has proven true in radiotherapy of the reticulum-cell sarcomas.

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The treatment of chronic arthritis is based upon routine examination and tests. A patient with low resistance should be given milder treatments than would be given to one in robust health.

All devitalized or crowned teeth should be viewed with suspicion. The tonsils should be inspected for congestion of the anterior pillars and an effort should be made in every instance to force concealed pus from the tonsillar crypts. Examination for flat feet and faulty posture should be made in an effort to eliminate these as contributory factors.

With the clinical facts to be obtained by thorough methods of examination it is usually possible to plan a satisfactory therapeutic regime and to obtain beneficial results in a large proportion of cases of rheumatoid arthritis. Patients with a mixed type of arthritis are the most difficult to treat. It is important to build up the patient's general resistance with proper diet, adequate elimination and a sufficient amount of rest. Analgesics such as sodium salicylate or aspirin are given in maximum doses to relieve pain. Heat in any form may be utilized.

If the joint symptoms are not relieved by ordinary methods and if roentgen examination reveals that the disability is due in part to a mechanical obstruction of the joint, operative removal is advised.

In the management of chronic arthritis treatment must be adapted to the individual patient and a combined method of treatment is usually utilized, namely: (1) relief of the mental depression, (2) controlled rest and exercise, (3) removal of the foci of infection, (4) modification of the diet when indicated, (5) drug therapy with aspirin and cinchophen, (6) vaccine therapy, (7) colonic irrigations, and (8) physical therapy and surgery.

In refractory cases the following methods of treatment are also utilized as indicated:

1. Gold therapy in the author's experience the results of this form of therapy are generally satisfactory. Varying degrees of improvement have been obtained. It is used in those cases which do not respond to the usual forms of treatment including the vaccine therapy.

2. Sulphur therapy the writer's experience with this method has been very limited.

3. Bee venom an improvement has been noted in several cases which have been very resistant to every other form of treatment. Artificial bee venom has proved unsatisfactory.

4. Roentgen therapy has been of definite value in several refractory cases.

5. Vitamin therapy is being tested on a group of 30 patients. Most of these patients have shown a general tonic improvement in the past year but the arthritis has remained almost unchanged.

6. Bihydrin and bile salts given intravenously the author has had little experience with this type of therapy.

RICHARD J. BENNETT, JR., M.D.

Coryn, G. Endocrine Diseases of the Skeleton
(Les affections endocriniennes du squelette)
Presse Méd. Paris 1937 45 1582

Coryn states that both experimental findings and clinical observations show that the anterior lobe of the pituitary gland influences the growth of the skeleton and that the influence depends upon the

function of the eosinophile cells. Clinical observation has shown that hypofunction of these cells results in an arrest of growth and dwarfism but such dwarfs unless there are some other endocrine disturbances are well proportioned. If hyperfunction of the eosinophile cells of the anterior pituitary lobe develops in childhood it results in gigantism, such pituitary giants are well proportioned. If hyperfunction of the eosinophile cells develops in adults it results in acromegaly. Pathologically the changes are noted in the cartilaginous structures, the cellular proliferation of the cartilage is diminished in hypofunction of the eosinophiles and increased in hyperfunction.

The author has found no evidence that the eosinophile cells affect the calcification of the skeleton. If other endocrine disturbances are associated there may be other skeletal changes but in the study of acromegaly and dwarfism without any associated endocrine disturbance the author has found no evidence of abnormal calcification of bones or of disturbances of calcium metabolism. He reports 2 illustrative cases, one of acromegaly in a man fifty-two years of age, the other a case of pituitary dwarfism in a woman fifty-seven years of age. In both these patients careful examination showed no evidence of thyroid, parathyroid, adrenal or gonadal hyperfunction or hypofunction. In both roentgenograms showed normal calcification of the bones and the blood calcium and calcium metabolism were found to be normal. ALICE M. MEYERS

Hanák F. Tennis Elbow (Tennissellbogen). *Bratislava Lek Listy* 1937 37 430.

Hanák gives a definition of tennis elbow as a condition which arises not only through playing tennis but also from other sports and occupations where the same muscle mechanism comes into play, as with shoemakers, painters, washerwomen, golf players, baggers and milkmaids. The symptoms are described and then the different opinions as to its cause. Hoshman considers the lesion as a periosteitis in the neighborhood of the lateral epicondyle of the humerus. Carp believes the cause to be an overexertion of the muscles, especially of the extensor digitorum communis. From perusal of the literature and his own experience Hanák believes it is due to use of muscles which have not grown accustomed to the demands placed upon them. Clinically the trouble is manifested by tenderness and pain at the insertion of the flexor digitorum communis on the outer epicondyle. The roentgenogram is negative. Many times on deep palpation the same pain can be elicited as with motion of the elbow.

The treatment is rest, and then gradual training of the muscles. For persistent pain roentgen therapy is excellent; after three treatments the pain disappears. Diathermy is useful. In acute cases very good results are obtained by fixation in a splint for three or four weeks and then roentgen therapy. Operation is condemned.

HAWTHORNE C. WALLACE, M.D.

Cloward, R. B., and Bucy, P. C.: Spinal Extradural Cyst and Kyphosis Dorsalis Juvenilis. *Am. J. Roentgenol.*, 1937, 38 681

Extradural cysts of the spinal cord which give rise to symptoms during adolescence are usually associated with kyphosis dorsalis juvenilis. A case is reported. Nine other cases collected from the literature are presented.

Spinal extradural cysts typically arise in the lower midthoracic region of adolescent boys. A severe spastic paraplegia results with slight sensory changes and usually without pain. These symptoms are practically always associated with kyphosis of the thoracic spine or with alterations in the vertebral bodies which are typical of the early changes in kyphosis dorsalis juvenilis.

Seventy per cent of this series occurred in adolescent boys ranging from eight and one-half to sixteen years of age. Two cases were noted in negro boys.

The initial symptom was practically always that of weakness in the lower extremities which progressed fairly rapidly to an incapacitating spastic paraplegia. In fifty per cent of the cases there was a disturbance in the function of the bowel or bladder or both. Rest with or without hyperextension brought about a striking amelioration of the symptoms.

Fifty per cent of the cases here enumerated showed a block of the spinal subarachnoid space. If Queckenstedt's test failed, lipiodol demonstrated a spinal block. Examination of the spinal fluid revealed a clear, colorless fluid. The protein content was rarely increased to any degree.

The anteroposterior roentgenogram demonstrated an increase in the size of the spinal canal. The interpedicular distance at the level of the intraspinal lesion was increased. The pedicles were reduced in thickness. The medial surfaces were flattened or concave, or the pedicles were reduced to thin lamellæ.

Alterations were present in the vertebral bodies typical of the early prekyphotic lesions of kyphosis dorsalis juvenilis. The earliest change in the vertebral bodies was a rounding-off of the anterosuperior and antero-inferior corners. This erosion continued until there were small step-like defects at these places. There was also a reduction in radio-density of the anterior one-half or one-third of the bodies. The superior and inferior surfaces of the bodies became irregular and prolapsed of the intervertebral disc or nucleus pulposus into the body occurred. The intervertebral space became thinner and cloudy and the bodies even came in contact with one another at times. The involved bodies then collapsed anteriorly and became wedge shaped. There was thus a rounded kyphosis in contrast to the sharp angular kyphosis of tuberculosis of the spine.

The differential diagnosis includes tuberculosis of the spine, simple uncomplicated kyphosis dorsalis juvenilis, syringomyelia, and tumors.

In gross appearance the laminae and pedicles are thinned. The cyst lies directly beneath the laminae

and fills the spinal canal posterior to the dura mater. The wall of the cyst is thin and white, and closely resembles the dura mater. The blood supply is by way of a pedicle which is apparently attached to one of the spinal roots. The contents of the cyst is a clear, colorless fluid practically identical with cerebrospinal fluid. The cysts are usually single and unilocular.

The wall of the cyst is composed of densely packed fibers of collagen. It is relatively acellular and avascular, the only vessels being on the external surface. The internal surface consists of a single layer of elongated, flattened cells which bear a striking resemblance to the arachnoid membrane. Microscopically the wall seems to be formed by a fusion of the dura mater and arachnoid into a single membrane.

The most logical hypothesis as to the origin of these cysts is that they arise as a diverticulum of the dura mater or a herniation of the arachnoid membrane. Apparently there is always a pedicle attached to the meningeal sleeve along one of the spinal roots.

Due to abnormal pressures of neighboring soft parts, bony absorption takes place. The intervertebral discs do not show absorption in response to increased pressure like bone.

The majority of cases of kyphosis dorsalis juvenilis occur in boys between the ages of fourteen and seventeen. Kyphosis is always rounded because of the partial collapse of a number of contiguous vertebral bodies, and is never angular, never severe, and is self-arresting. It is most severe in the eighth and ninth thoracic vertebrae and is always limited to the lower half of the thoracic spine. Changes in the vertebrae are limited to the superior and inferior surfaces, especially the anterior part. At first the patient is able to correct the deformity voluntarily, but within a few months the deformity becomes fixed. The authors believe the causes are similar to those of spinal extradural cyst.

The kyphosis dorsalis juvenilis present in association with spinal extradural cysts is due to compression and occlusion of the venous channels draining the vertebral bodies by the cysts. Kyphosis dorsalis juvenilis unassociated with spinal extradural cysts may also be due to venous congestion and stasis within the vertebral bodies.

RICHARD J. BENNETT, JR., M.D.

Iversen, S. C.: Hip Disease in Childhood and Its Consequences (Die kindliche Hüftgelenkentzündung und ihre Folgezustände). *Hosp.-Tid.*, 1937, p. 629

The results in 29 cases of non-specific coxitis of early childhood were reported. The condition rather suddenly affects apparently healthy children. Frequently a primary focus of infection is found: a mild enteritis, skin lesion about the anus, an infected umbilical stump, angina, bronchitis, pneumonia, or otitis. Pneumococci, staphylococci, and streptococci are the predominating etiological factors in coxitis of childhood; colon bacilli, enterococci, and

Pfeiffer's influenza bacilli are also factors even tuberculous disease of the hip may occur in the first years of life. Characteristic are the localized abscesses with dependent perforation and discharge of a large volume of pus spontaneously or after incision. Healing is the rule within a few weeks. Nevertheless even mildly affected patients may develop a lump. Often, despite few typical symptoms a chronic dissecting fistula may develop. Spontaneous healing without abscess formation or perforation occurs occasionally but often in these cases an erroneous diagnosis is established, overlooking such conditions as lymphadenitis, rickets, erysipelas, tuberculosis and congenital dislocation of the hip. The pathological changes are frequently only of the synovial type: destruction of cartilage, pannus, rupture of the capsule and peritubercular abscesses usually an osteoarthritis predisposes to a secondary pyarthrosis and has its origin in the capital epiphysis. Infantile paralysis, Parrot's syphilitic pseudoparalysis and Barlow's infantile scurvy should be considered in the differential diagnosis. In general the prognosis for life is good. A typical sequela is a dislocation of the hip from distention with a more or less marked defect of the head and neck.

The persistent lesions of the hip are classified into 4 types by the author: (1) dislocation with destruction of the head and neck (20 patients); (2) dislocation with mild defects of the head and neck (4 patients); (3) no dislocation (2 cases); and (4) subluxation of the head (3 cases). Bony ankylosis which is so frequently seen in tuberculous coxitis is practically never present in these cases. Residual bone shortening may be considerable. Limitation of motion, muscle weakness and contractures are common findings. Pain is the outstanding symptom in the adult and usually predominates in the hip, seldom in the back. These are the most frequent grounds for invalidism. In dislocation the hip should be replaced as soon as possible. When treatment by abduction is necessary it must be prolonged at best using splints and plaster jackets. When stretching is indicated it is managed by extension. Finally orthopedic and surgical care must be employed such as compensatory adjustments for shortening by specialized shoework, tenotomy and capsulotomy for flexion contracture and osteotomy.

(HAAGEN) JEROME G. FINDER, M.D.

Amprino R. and Trivellini A. The Functional Significance of the Architecture and Structure of the Neck of the Femur at Various Ages and in Pathological Conditions. (Il significato funzionale dell'architettura e della struttura del collo del femore nelle varie età ed in condizioni patologiche). *Arch. ital. chir.* 1937 47 1.

The authors give a detailed and precise description of the mechanical and structural factors in the upper end of the femur as demonstrated by study of the trabeculae in the spongiosa. There are a number of illustrations which clarify the method of study and indicate the objective findings.

The disposition of the connective-tissue fibers, the quantity of interfibrillary substance, the existence of cartilaginous cell nests and the presence of calcium salts have an important influence on the resistance of the tissues to mechanical stress. The connective tissue fibrils respond chiefly to traction; the interfibrillary substance augments the cohesion of the fibers themselves. The cellular groups especially the cartilage increase the elasticity to pressure by acting as little cushions. The direction of the collagenous fibers bears a close relation to the mechanical functions. The relation between structure and function of bone is very complex. The factors mentioned are so arranged as to form a homogeneous physical system. Also the substances are so arranged that every single part of the skeletal system offers a characteristic and individual reaction to every mechanical stress such as muscular action, body weight and trauma. Previous investigators have been impressed by the characteristic distribution of the compact substance and the spongy substance in various bones. The trabeculae of the spongy substance, their varied form and extent, are not grouped accidentally but respond to the forces to which the individual trabeculae are exposed. In cases in which these individual forces have been analyzed it has been found that the direction of the trabeculae corresponds in a definite manner to the so-called isostatic line of a physical body. This disposition of the tissues results in a great economy in the materials, as may readily be recognized by studying the compact substance in the diaphysis of a long bone. Ordinarily there is a generous supply of materials, but in old age there is a senile osteoporosis with a corresponding diminution in bone materials. It is probable that in part this depends on a diminution in the intensity of the mechanical actions to which these substances are exposed in old age. However, the residual bone matter in the aged is arranged most advantageously for purposes of function. Thus in old age the smaller amount of bone substance gives the same results as a much larger quantity of bone might give a young person.

The authors have studied minutely the head and superior epiphysis of the femur at various ages and under varying conditions of function. Frontal and transverse sections were studied microscopically as well as roentgenologically and compared with similar sections from femora which had not been subject to stress for long periods because of amputation or disease. The object of the investigation was (a) to determine the structure of the spongiosa in the upper end of the femur in the adult and its variations at different ages; (b) to illustrate the structure of the spongiosa in cases not subject to normal function; and (c) to determine the mechanical significance of the various tissue elements in the spongiosa. The authors find three principle systems of trabeculae in the superior epiphysis of the femur: (1) the straight trabeculae; (2) the curved; and (3) the supporting. The authors found these trabeculae to vary in individuals at various ages. These variations are

shown in suitable illustrations. In the infant these tissues are large fragments of irregularly placed lamellar bone. The central trabeculae are the oldest, the new bone is laid down at the periphery under the periosteum. In osteoporosis it is the central trabeculae that are first involved. With the appearance of senile osteoporosis the individual differences in bone structure become more apparent.

In discussing the relation of bone architecture to function, the authors point out that the weight of the body, which falls on the head of the femur, tends to flatten the neck. In the neck of the femur the straight trabeculae counteract the effects of pressure stress and the curved trabeculae react to the flattening tendency exerted by the weight of the body.

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Open operation shortly after the appearance of the symptoms does much to minimize undesirable secondary features. In older patients and in infants who fail to respond to physical therapy, the best results are obtained by operative interference. The contracted muscle may be incised at its origin, its insertion, or anywhere along its course, but, irrespective of where the muscle is divided, a complete division of all contracting bands must be carried out.

Postoperatively, sandbag immobilization is recommended. Physical therapy in the form of active and passive movement is started as soon as the pain has subsided. Massage is instituted as soon as the wound is well healed. The patient is allowed to be up in from twelve to fourteen days. The results are encouraging.

RICHARD J. BENNETT, JR., M.D.

Orell, S.: *Surgical Bone Grafting with "Os Purum," "Os Novum," and "Boiled Bone."* *J Bone & Joint Surg*, 1937, 19: 873.

In addition to using fresh autoplasmic bone grafts, the author uses bone obtained from meat-packing houses and amputation specimens after preparing them by a physicochemical process, subperiosteal implantation, and by boiling. Each process of preparation yields a bone that has its special range of use, its advantages, and disadvantages.

Os purum is composed of the calcium framework of dead bone from which the proteins, connective tissue, and fat have been removed by a physicochemical process. The blood protein is extracted by soaking the bone in salt solution, the connective tissue on the bone surface and in the Haversian canals is removed by soaking it in warm potassium hydroxide, and the fat is extracted with acetone.

Os purum has a technical advantage in that it can be kept on hand in a dry form and sterilized by boiling in physiological salt solution. This dissolves a part of the collagenous glue-like material, and makes the material softer and easier to handle. It may be obtained in various sizes and can easily be given any desired shape.

Os purum is used as implants in the skeleton, that is, in places containing skeletal connective tissue. This connective tissue proliferates and quickly forms a large amount of new bone in the clefts between the implant, the fixed bone in the bed, and the periosteum, and grows into the Haversian canals of the os purum. Os purum was used in about 50 cases in which bone had been resected for various reasons, most often for tuberculosis, in order to fill the defects, to lessen the risk of deformities, and to fix skeletal parts one to another.

Os novum is immature living bone tissue with great proliferative power. It is produced by implanting a long narrow os-purum splint subperiosteally over the anteromedial surface of the tibia. When the material is excised from one to two months later, a profuse growth of new, soft, vascular bone is found in the clefts between the periosteum, the os purum, and the tibia. This new bone is excised and transplanted to areas where extraskeletal connective tissue separates two bones which are to be joined through transplantation, for example, in osteosynthesis of the spinous processes in tuberculosis of the vertebrae, arthrodesis in iliosacral tuberculosis or tuberculosis of other joints, and in osteosynthesis in pseudarthrosis. As a rule in the latter case no excision of the soft tissue of the pseudarthrosis is done. The os novum is laid down in longitudinal strips like periosteal callus around a pseudarthrosis.

"The transformation of the new bone formed after the implantation of os novum proceeds more uniformly than is the case after the transplantation of fresh mature bone, probably because calcium-containing necrotic bone prevents the formation of new bone. The newly formed splint is firm throughout. Weak areas or defects do not appear as readily as after the transplantation of mature fresh bone, and consequently fractures do not occur. No real fracture of os novum has been observed in any of the cases operated upon to date.

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newly formed skeletal connective tissue cells are unable to penetrate the mass

The soft and vascular osteoid and newly formed skeletal connective tissue of os novum readily absorbs nutrition and forms new bone. Because of its softness, it can be shaped easily and without injury to fit the new bed and it is better tolerated by the soft tissues than is fresh, mature hard bone. Scarred eczematous skin for example which is often present over a pseudarthrosis does not seem to be so greatly irritated by os novum as by hard bone.

At first os novum gives only slight mechanical support and cannot therefore, be used for the internal fixation of bone parts. Since it is easily nourished and has great proliferative power it is suitable for cases in which rapid new bone formation is desired and where fresh material should not be taken from the skeleton itself, as for example in children with delicate bony framework. If increased internal fixation is desired a combination of os purum and os novum may be used.

Boiled fresh bone contains proteins connective tissue and fat. When boiled and dried bone is used for grafting its resorption and the growth of new bone proceed very slowly and the result is much less satisfactory than when fresh boiled bone is used.

The author has resected osteomyelitic and tumor infiltrated bones, boiled the resected specimens in physiological salt solution to kill the bacteria or tumor cells, cleared the bone of diseased tissue masses and replanted them for mechanical support until new bone had been developed.

Four cases of chronic osteomyelitis and a case of malignant periosteal osteogenic sarcoma in the upper end of the humerus were treated by resection and reimplantation of boiled bone. None of the cases showed recurrences. The patient with the osteogenic sarcoma died from a pulmonary metastasis fifteen and one half months after the operation and no recurrence in the humerus or in the soft parts of the upper arm was found at post mortem examination.

Resection and replantation of boiled bone is used because it is difficult to duplicate the size, shape and structure of the affected part with other forms of bone graft.

The study of bone grafting teaches us that the bone should be considered as a tissue, the survival of which like other living tissues is dependent upon good nutrition. Every effort should be made to favor the nutrition of the soft tissues about the surface of the fixed bone in the operative field. The periosteum should not be separated from the soft parts lying outside and the connective tissue in the haversian canals should not be injured through damage to the nutrient vessels. The instruments should be as small as possible and produce the least possible trauma. Experience has taught that the best method of exposing the bone is to loosen the periosteum from it. Nothing is gained by traumatizing the tissues lying external to the periosteum.

ROBERT P. MONTGOMERY, M.D.

Harkins H. N. and Phemister D. B. Only Grafts. *J. Am. M. Ass.* 1937 109 1501

The authors describe a simplification of bone grafting technique which is applicable to ununited fractures of long bones and the mandible if the fragments are in satisfactory position pre-operatively. Whole thickness and cancellous bone grafts are used together as onlay grafts. The only internal fixation of the grafts is that accomplished by suture of the soft parts over them. Stripping of soft parts from the bone is done only in the region chosen for the bed of the graft. Projecting bone and callus are removed to give a flat surface for contact of the grafts. Callus and fibrous tissue intervening between the ununited fragments was usually curetted out but it was found that intermedullary bony callus need not be removed from the fragment ends. Grafts were usually removed from a normal tibia but occasionally a long fragment was the source of a graft. Periosteum was never allowed to intervene between the graft and cortex of the ununited fragments. The region was immobilized postoperatively for two or three months.

This method can occasionally be applied to ununited tibial fractures in which there is residual infection anteriorly but none posteriorly. The grafts are applied through a posterior approach and the infected field is not entered.

The method was used in 39 of 95 cases of ununited fractures presented during the past eight years. In 38 the operation resulted in union and in the thirty ninth bony union was attained after reoperation. The method avoids the extensive stripping of periosteum incident to most other operative procedures and reduces surgical trauma as well as necrosis of the bone ends at the site of ununited fractures in selected cases to which it is applicable.

ROBERT PORTIS, M.D.

FRACTURES AND DISLOCATIONS

Cozen L. Congenital Dislocation of the Shoulder and Other Anomalies. Report of a Case and Review of the Literature. *Arch. Surg.* 1937 35 956

A case of multiple congenital deformities with bilateral dislocation of the shoulders is reported. It was difficult to determine the cause. The case was differentiated from traumatic cases in which there is a history of abnormal delivery, cases in which there are paralytic muscles in the affected arm and also from cases presenting other congenital deformities.

The patient was first operated on by reefing the pendulous capsules but after a period of four years it was necessary to do a Nicola operation on one shoulder because of relaxation of the capsule. The result of this operation was excellent shoulder function.

The general outline of treatment may be expectant, manipulative or operative.

FLENNY J. BERKHEIMER, M.D.

Bates, W.: Fracture of the Upper Third of the Humerus. *Surg Clin North Am*, 1937, 17 1585

The author makes a broad classification of fractures of the upper third of the humerus, i.e., those that are associated with dislocation and those that are not. Treatment for each group is discussed.

He believes that the dislocation should always be reduced before an attempt is made to treat the fracture. Roentgenograms should be taken before the reduction of the dislocation. Fractures of the greater tuberosity associated with dislocation should be immobilized from four to five weeks in 90 degrees abduction with 180 degrees of external rotation. Fractures of the surgical neck with dislocation frequently require traction of the arm at right angles to the body for from seven to ten days before immobilization in 90 degrees abduction and 90 degrees external rotation. In fractures that are not associated with dislocation and are impacted the author advises a plaster-of-Paris shoulder cap and sling for five or six weeks with elbow, wrist, and finger motion after two weeks. If there is gross displacement and manipulation is unsuccessful, traction for ten days may be necessary.

For after-treatment the author has found well supervised occupational therapy the most valuable. The article is illustrated with roentgenograms.

BARBARA B. STIMSON, M.D.

Robertson, D. E.: Fractures and Dislocations Involving the Elbow Joint in Children. *Am J Surg*, 1938, 39 327

The diagnosis of fractures, dislocations, and other injuries about the elbow joint in children depends upon pain, loss of function, swelling, and corroboration by a roentgenogram. Each type of injury requires an accurate diagnosis and special treatment.

Examination of the extremity for impairment of function of the blood vessels and nerves should be made before treatment. Incomplete division of the median nerve and rupture of the brachial artery may occur in supracondylar fractures. If there is any interference with the circulation or the innervation, it is advised that these abnormalities be demonstrated to assistants, nurses, or parents before any treatment is started. Many suits for malpractice may be avoided in this way.

Reduction of the injured part should be done as soon as possible after the accident. Marked shock is the only justifiable reason for delay and even when marked shock exists, gross deformity should be diminished. Surgical treatment may be delayed as there is no special urgency for open reduction.

Close observance of the limb, distal to the fracture, during the first forty-eight hours following reduction will lessen complications.

No morphine should be administered to any patient who has had a reduction of a fracture of the elbow joint without first ascertaining that there is a full and complete blood supply to the hand and that the patient is well able to move his fingers and hand.

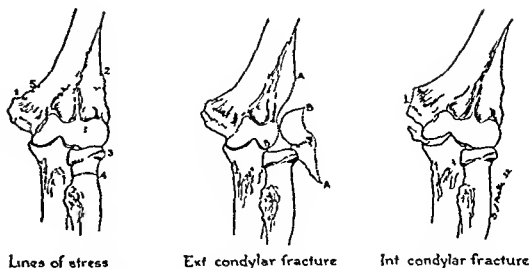


Fig 1 *Condylar fractures*. Lines of stress. The lines of fracture in the lower end of the humerus follow (1) the internal condylar fracture, (2) the external condylar fracture, (3) and (4) the lines of fractures that occur in the head and neck of the radius. *External condylar fracture*. The rotation of the fragment is shown so that the fractured surface lies under the skin. Its reduction requires rotation through 160 degrees. *Internal condylar fracture*. Dislocation of the fractured element into the elbow joint to lie between the ulna and the trochlea. (Courtesy of Am J Surg.)

Postoperative and postmanipulative roentgenograms must show indisputably the correct and accurate reduction of fractures and dislocations. A clear anteroposterior view of the lower end of the humerus, with the elbow flexed, can be obtained only if the arm is flat on the plate, the tube in position directly above it and the forearm at an angle to the tube. This technique reveals the outline of the lower end of the humerus without distortion, and until this outline is correct a good result cannot be expected. One should not be satisfied with anything except a perfect reduction in fractures involving articular surfaces.

Injuries about the elbow are classified by the author and discussed individually. Pertinent aids and precautions in the treatment and follow-up care are presented.

Supracondylar fractures are most likely to produce impairment in the blood and nerve supply. The distal fragment is often displaced laterally as well as posteriorly. Swelling causes a correct position to appear as overcorrected, but this rarely occurs. Overcorrection is more desirable than undercorrection.

Caution should be taken in the interpretation of the roentgenograms of lateral epicondylar fractures because the capitellum remains in correct line with the head of the radius unless rotation is marked. If inadequate reduction is obtained a valgus deformity will develop and a tardy ulnar nerve paralysis may occur years later. If an open reduction is necessary the fragment should be securely fixed. The author uses screws or fine dowels of beef bone. The operative technique of fixation is described.

Fractures of the medial epicondyle result from a pull on the internal lateral ligament. The fragment is never very large, but in most instances it is dropped into the elbow joint, which necessitates an open reduction.

Fractures of the head and neck of the radius require an open reduction if the deformity is marked.

A fracture of the proximal half of the shaft of the ulna cannot occur without a dislocation or fracture of the head of the radius or of its shaft. Correction of this requires an open operation because it is almost impossible to replace the head through and into the ligament by any other method.

The pulled elbow results when the weight is borne through the arm with the elbow hyperextended. The hyperextension allows the upper part of the articular ligament of the head of the radius to fall into the space between the head of the radius and the capitulum. The roentgenograms are negative. The treatment consists of grasping the child by the wrist supinating the forearm and extending the elbow. Frequently there will be heard a loud crack in the elbow joint, the pain will have disappeared and full voluntary movement is restored.

ROBERT P. MONTGOMERY M.D.

Lapidari M. So-Called Luxation of the Semilunar Bone of the Carpus (*Sulla cosiddetta lussazione del semilunare*). *Arch ital di chir.* 1937 47 295

Luxation of the carpal semilunar bone associated or unassociated with fracture of the other carpal bones especially the scaphoid is a lesion which does not occur very frequently. From the beginning this lesion is followed by considerable functional disturbances associated with much pain but in the majority of cases the surgeon is consulted too late to institute efficacious treatment.

Donati has subdivided this lesion anatomicopathologically into four types:

1. Anterior luxation of the semilunar bone either subglenoidal or preglenoidal.

2. Posterior retrolunar luxation of the hand i.e., a posterior luxation of all the bones except the semilunar, the dislocation taking place along the perilunar articular line. The dislocated bones are shifted to a

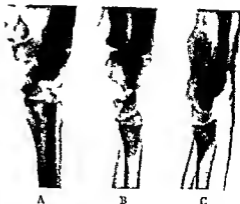


Fig 2A Retrolunar luxation of the carpus with anterior luxation of the semilunar bone complicated by a fracture of the scaphoid. (Variety III of Donati.)

Fig 2B Condition after a few minutes of traction. The space of the semilunar bone between the radius and the os magnum (capitulum) is restored. The semilunar bone is partially reduced.

Fig 2C The semilunar bone is completely reduced.

plane posterior to the semilunar bone but not posterior to the radius.

3. A combination of the two aforementioned lesions.

4. Retrolunar luxation of the hand associated with a fracture of the scaphoid bone. In this type the semilunar bone and the proximal fragment of the scaphoid maintain their relationships to the radius and remain in their original position whereas the distal fragment of the scaphoid follows the dislocation with the other carpal bones.

Luxation of the semilunar bone rarely occurs bilaterally and it is most commonly produced when the hand is violently thrown into hyperextension usually as the result of a fall. Fracture of the scaphoid bone is due to crushing because this bone is violently compressed between the carpal bones of the distal row and the fossa of the radius at the instant of the trauma.

The symptoms associated with this injury include pain and functional impairment of the wrist extending into the fingers which are held in semiflexion. The fingers cannot be extended or flexed.

Objectively a deformity of the dorsum of the hand can be noticed and this may often lead to an erroneous diagnosis of Colles fracture. Diagnosis is made definite by means of the roentgenogram.

The prognosis of the untreated cases is very poor as far as carpal function is concerned. Physical therapy and mechanical measures are usually of no avail and for this reason patients usually consult the surgeon too late. Donati observed that on the average, patients sought surgical relief in from three to thirteen months following trauma.

First it is imperative to have roentgenological evidence of the type of lesion. Reduction of the luxa-

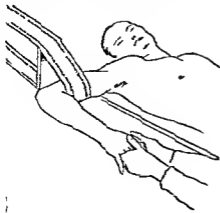


Fig 1

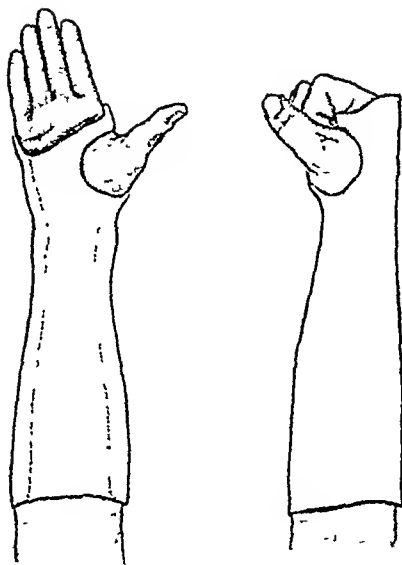


Fig 3 The dotted lines indicate the limits of the plaster cast on the volar surface of the forearm

tion-fracture should be initiated immediately thereafter. Non-surgical treatment should be attempted first in every case. For this purpose the author uses infiltration anesthesia into the radiocarpal joint with 20 cc. of a 2 per cent solution of novocaine. Traction is then applied as is indicated in Figure 1, after the upper arm has been fixed as shown in the illustration.

Figure 2A shows a retrolunar luxation of the carpus with an anterior luxation of the semilunar bone complicated by a fracture of the scaphoid. Figure 2B illustrates the condition after a few minutes of traction. The space occupied by the semilunar bone has been restored and the bone itself is partially reduced. Figure 2C shows complete reduction of the semilunar bone.

Following reduction, a dorsal antibrachial cast is applied as shown in Figure 3. The dotted lines indicate the limits of the plaster cast on the volar surface of the forearm. The fingers should be left free. Immobilization is maintained for from twenty to twenty-five days in simple cases, but in the presence of scaphoid fractures it should be prolonged to about two months.

During the period of immobilization the patient is instructed to move the fingers often in order to avoid joint rigidity, muscular atrophy, and osseous decalcification.

Some authors recommend immediate surgical removal of the semilunar bone because they believe that otherwise a necrosis of the semilunar bone (Kienboeck's disease) will ensue, but Lapidari be-

lieves that in every case non-surgical treatment should be attempted first.

RICHARD E. SOMMA, M.D.

Ferguson, L. K.: Fractures of the Carpal Scaphoid. *Surg Clin North Am*, 1937, 17: 1603.

The author believes that with early and adequate immobilization most fractures of the carpal scaphoid heal with satisfactory functional results. The diagnosis should be suggested by careful examination and confirmed with the roentgen rays. A most helpful sign is pain elicited by pressure on the extended thumb toward the wrist. Immobilization by an accurately fitting unpadded plaster-of-Paris gauntlet from the metacarpal heads to the elbow and including the metacarpophalangeal joint of the thumb should be maintained for eight weeks.

"In 18 of 19 recent fractures good results were obtained, although bony union was not obtained in every case. In 5 of 6 old fractures, good functional results were obtained by the same treatment, although bony union was not obtained."

BARBARA B. STIMSON, M.D.

Aleman, O.: The Treatment of Fracture of the Navicular Bone of the Carpus (Ein Beitrag zur Behandlung der Fractura ossis navicularis carpi). *Acta chirurg. Scand*, 1937, 80: 217.

The following classification of fractures of the navicular bone of the carpus is offered: (1) depressed fracture (extra-articular), (2) fracture of the tuberosity (extra-articular or intra-articular), (3) transverse fracture of the body (intra-articular), and (4) combinations of (1) and (2).

The result of the treatment of a fracture is judged partly from the anatomical and partly from the functional standpoint. With intra-articular fractures, good anatomical healing usually leads to good function, and a good functional result usually leads to an anatomically satisfactory healing. However, this does not always obtain with fractures of the navicular bone of the wrist. The functional demands put upon the wrist joint vary considerably with the occupation of the patient. One patient, whose old transverse fracture was treated conservatively by fixation while in military service and who later became a merchant, years later claimed to have been completely cured, but a later roentgenogram revealed a pseudarthrosis. Had this patient been compelled to become a handworker he would certainly have had arthritis deformans with considerable symptoms. If no roentgenogram had been taken the result would have been considered good. If good results are claimed in a case of fracture of the navicular bone from any kind of treatment, it is necessary, especially if no roentgenogram has been taken, to report upon the patient's occupation when determining the grade of the functional demands upon the wrist joint.

The author's material consists of all the navicular fractures seen at the Military Hospital at Stockholm from 1916 to 1935, those of the military personnel



Fig 1

and one nurse. There were 91 cases among 83 patients, 2 of which were bilateral and 6 showed poor results from conservative treatment. The patients were generally young persons in the second decade of life. Fifty-two fractures were in the right wrist and 39 in the left. Of the fractures of the body of the bone, transverse fractures, 36 were fresh or early fractures and 43 were old cases and pseudarthroses. Resorption cavities, so-called vacuoles, were found in 31 cases. They were located in the proximal fragments in 2 cases, in the distal fragments in 11, and in both fragments in 18 cases. There were 3 compression fractures, 9 fractures of the tuberosity, and 79 transverse fractures and pseudarthroses.

The conservative treatment consisted of immobilization by an unpadded circular plaster cast in the neutral position of the wrist joint and with free mobility of the fingers. Fresh transverse fractures were immobilized for from four to eleven weeks. The period of fixation was later gradually increased. After treatment with baths and active motion was continued for two weeks.

On 5 patients with pseudarthroses or delayed consolidation of a transverse fracture, Beck's drilling



Fig 2



Fig 3

procedure was carried out, and a plaster cast applied for from six to twelve weeks. The operative treatment consisted of extirpation of a fragment. When the fragments were of different sizes, the smaller was removed, and if they were of equal size, the distal one was removed. For removal of the proximal fragment, arthrotomy was done through an axial incision along the ulnar border of the tendon of the extensor carpi radialis, and for removal of the distal fragment, an axial incision was made in the snuff box with a transverse incision through the joint capsule. The collateral ligament between the radius and carpus was not found. Following the operation, the joint was immobilized for only one week, after which baths and active motion were prescribed. Work could be resumed usually within four weeks.

The results of treatment were classified as good, moderately good, and poor. A good result denotes a painless joint and full working ability in the conservatively treated and roentgen controlled cases; there is bony healing, the mobility is normal or almost normal, and the power is the same; there are no contractures. A moderately good result denotes slight subjective symptoms on exertion, and otherwise the same as the previous category. Poor results are those with pseudarthroses with or without arthritis, with no or only slight symptoms.

There were 3 compression fractures, 2 of which were followed up, and the results pronounced good. The treatment had been fixation for two weeks. Of 9 fractures of the tuberosity, 8 were treated by immobilization for from two to four weeks in a plaster cast. One case was untreated. In 8 of these cases, the results were good. In 1 case, the results were less satisfactory, and fifteen years later the patient complained of weakness and pains on exertion. The last case was one of intra-articular fracture, in which type the prognosis is not altogether good.

Most of the fractures of the navicular bone are transverse. If the fracture was of less than three

months' duration, fixation with a circular plaster cast was done. There were 31 such fractures. Of these 23 were cured and gave no further symptoms, bony healing was confirmed roentgenologically in 14. One result was less satisfactory. Seven cases showed poor results with pseudarthroses. Constitutional differences in addition to the changing pathological conditions of the fractures control the prognosis.

In 6 cases of old injuries and pseudarthroses, Beck's drilling procedure gave poor results. It was found that pseudarthroses developed and that the fragments were diminished in size by resorption. Old injuries sometimes heal well if immobilization is continued for several months. Six patients with pseudarthroses which were not treated had considerable symptoms.

None of the patients who were operated upon showed contracture of the wrist joint. Apparently, the leaving of one fragment prevents this complication, which is difficult to avoid after total extirpation of the navicular bone. When the proximal fragment is removed, the distal fragment tends to approach the os lunatum without contacting it (Fig. 1), but when the distal fragment is extirpated, there is no sign of "wandering" of the carpal bone or of the remaining proximal fragment and the stability of the wrist is well maintained (Figs. 2 and 3). Extirpation of the fragment generally results in ability to work and continued good health, after one month's continuous treatment, in at least 84 per cent of the cases, and continued full working ability in the remaining 16 per cent. Therefore the author believes that this operative treatment of older fractures gives better results than conservative treatment.

LOUIS NEUWELT, M D

Matti, H.: The Treatment of Navicular Fracture and the Refracture of the Patella by Filling with Cancellous Bone (Ueber die Behandlung der Navicularefraktur und der Refractura patellae durch Plombierung mit Spongiosa). *Zentralbl. f. Chir.*, 1937, p. 2353.

Fracture of the carpal navicular bone is often unrecognized and therefore non-union often develops. The treatment of the fresh navicular fracture is no longer under dispute, it consists of fixation in the customary way for from six to ten weeks and thereafter active exercise. In the stage of the so-called traumatic cyst formation one can obtain healing according to Boehler within four to eight months by immobilization of the wrist in a dorsal plaster splint. However, the fixation treatment of the fully developed non-union with occluded sclerotic bone surfaces has no rationale. As Schneek has shown, Beck's drilling operation under the fluoroscope can bring about bony healing. After operative removal of both navicular fragments there is a radial deviation of the hand and an incomplete return of function.

The author has evolved a new method, the filling of both fragments and the space between with fresh living cancellous bone, which already in 3 cases has

given completely satisfactory results. Exposure of the navicular bone is made through a radiodorsal longitudinal incision over the radial epiphysis to the base of the second metacarpal. Preservation or notching of the dorsal carpal ligament is followed by exposure of the crossing of the tendons of the extensor carpi radialis brevis and the extensor pollicis longus with retraction of the tendons radially. The joint capsule is opened longitudinally, close to the lateral border of the tendon of the extensor carpi radialis. One then comes upon the navicular-lunate joint and finds the separation of the fragments. On the dorsal side the cartilage together with the cortex is nipped away and the fragments are hollowed out with a sharp curette. Finally, like the work of the dentist in inserting a gold filling, the filling with cancellous bone from the greater trochanter is undertaken, and that with suitable material. The spaces are completely filled; tight closure of the joint capsule is made. Removal of the cancellous bone through a longitudinal incision is done in a simple manner from the outer side of the trochanter.

The early filling with cancellous bone of the developing non-union of the navicular is the best prophylaxis for post-traumatic arthritis of the wrist joint. For the refracture of the patella in which similar circumstances come under discussion, Matti recommends the filling in a similar manner. For securing the fragments a tight cerclage of rustless steel wire is used to guard against further separation. The surrounding wire is removed in case of later trouble, but only after six months at the earliest and only after roentgen control. The original work contains 7 explanatory illustrations.

BARBARA B. STIMSON, M D

Munro, A. H. G., and Irwin, G. G.: Interlocked Articular Processes Complicating Fracture-Dislocation of the Spine. *Brit. J. Surg.*, 1938, 25: 621.

Three detailed case reports of fracture-dislocation of the spine with paraplegia and an associated interlocking of the transposed intact articular processes are presented. Radiographs taken before and after hyperextension therapy and after operative reduction, and a print showing the method of supporting the patient while lying in a plaster bed accompany the case reports.

It is suspected that the complication of interlocking of the transposed articular processes occurs with comparative frequency in cases of fracture-dislocation of the spine with paraplegia and that it goes unrecognized.

Fracture-dislocation of the spine with transposition of the articular processes is produced by indirect violence, and occurs most commonly in the lumbar region. The force, applied to the shoulders and upper thoracic area, is of such a degree as to cause disruption of the interspinous ligament, followed by a carrying forward of the upper dislocating vertebra over the vertebra below. Owing to the extreme flexion of the spine, the articular facets are

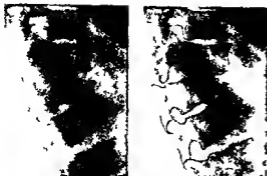


Fig 1. Radiograph and tracing showing fracture-dislocation between the eleventh and twelfth dorsal vertebrae with interlocked articular processes. Slight posterior compression of the eleventh vertebral body. Anterior compression of the twelfth vertebral body and separation of a small anterior fragment. Slight anterior compression of the first lumbar vertebral body.

separated and the position of the processes transposed without a fracture occurring. The inferior processes finally come to rest upon the laminae of the subjacent vertebrae and in front of the corresponding superior processes. A compression fracture of the vertebral body below the dislocation is usually also present.

Paraplegia may be produced by concussion, edema of the cord or surrounding tissues, pressure of the extravasated blood, hematocystia, and attenuation of the cord. The cord is not directly crushed in these cases since the intact processes prevent it. Tension occurs, however, as the cord is stretched between the laminae of the vertebra above and the posterior lip of the vertebral body below, so that rupture partial or complete may occur because of attenuation between these two points.

It will be evident from these remarks that any treatment manipulative longitudinal traction, or hyperextension which tends to increase the tension of the attenuated spinal contents is contra-indicated. The prompt operative removal of one or both of the superior articular processes of the vertebra below the dislocation however offers a means of reduction without this disadvantage and with minimal disturbance to the patient. In most cases it is necessary to remove only a portion of the anterior part of each superior articular process to effect a reduction. This

modification has the advantage of preserving the major portion of the processes and thus helps to maintain reduction and to increase the stability of the spine.

A description of the operative technique with comments on the difficulties encountered prior to during and following operation is given.

Ten cubic centimeters of a 1 per cent novocaine solution are injected over the kyphosis to prevent shock by virtue of relieving pain and muscle spasm. A sedative is also recommended.

ROBERT P. MONTGOMERY, M.D.

Funsten R. V., Kinsler P. and Frankel G. J.
Dashboard Dislocation of the Hip: A Report
of 20 Cases of Traumatic Dislocation. *J. Bone
& Joint Surg.* 1938, 20, 124.

The authors report a series of 20 cases of traumatic dislocation of the hip. They select the name dashboard dislocation because it points out the mechanism by which most of these patients received their injuries. The person was usually sitting beside the driver of an automobile which came to an abrupt stop in a collision and his knee or tibia struck the dashboard panel forcibly and since the hip was in a flexed and adducted position the force of the impact was transmitted through the femur to the posterior rim of the acetabulum and resulted in dislocation or fracture dislocation of the hip.

The best results were obtained in fresh cases with treatment by immediate closed reduction followed by traction. Simple dislocations were kept in traction for two or three weeks while those with a formidable fracture of the acetabulum were held for about eight weeks. Active motion of the knee and hip was carried out during the period of traction. When the dislocation was more than a few weeks old operation was required; the prognosis for a satisfactory result becoming poorer the longer the hip stayed out of place. The chief cause of permanent disability was absorption of the femoral head which apparently results from injury to the nutrient arteries of the neck together with rupture of the ligamentum teres.

The authors include in their series a rare case of traumatic dislocation in a newborn infant as the result of podalic version in delivery. Reduction was easily accomplished under anesthesia and a spica cast was applied for ten days. Five years later the hip was apparently normal.

DANIEL H. LEVINTHAL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Lowenberg, E. L.: Varicose Veins Treated by Combined Ligation and Injection *Surgery*, 1937, 2
903

Because the present popular method of treating varicose veins by the injection of sclerosing solution is simple and safe, inexpensive, and ambulatory, it appeals to both the physician and the patient. The author notes that when employed alone the method is followed by frequent recurrences, even more than those following the older operations of ligation, stripping, and excision. To avoid these recurrences and to facilitate primary obliteration by injections he describes a method of treating varicose veins by combined ligation and injection. In general he employs the injection method alone for simple cases with a negative Trendelenburg test, and radically high ligation and simultaneous injection, whenever the saphenous is dilated high in the thigh and whenever Trendelenburg's test is positive.

The normal anatomy of the venous system of the lower extremity is described and the changes in the varicose condition are outlined. A discussion of the examination of the patient is presented. Methods for treatment by ligation are suggested.

The contra-indications to combined ligation and injection are relatively few. Persistent occlusion of the deep veins constitutes a definite contra-indication. Nephritis, hyperthyroidism, and cardiac disease may make the procedure inadvisable. Pregnancy is not a contra-indication. To the contrary, high ligation influences favorably even varicosities of the vulva in pregnancy.

In his description of the technique of ligation and simultaneous injection of the saphenous vein at the femorosaphenous junction, the author stresses the importance of the removal of the saphenous stump and division of the branches usually encountered at the femorosaphenous junction. A transfusion cannula is inserted into the lumen of the vein. After fixation of the cannula 5 c. cm. of 5 per cent sodium morrhuate are injected into the lower end.

Finally, the author concludes that injection treatment of varicose veins is adequate for relatively small and isolated varicosities. Recurrences almost invariably result when this method is employed alone for larger varicosities directly related to the incompetent long and short saphenous vein. Such cases require interruption of the downward venous pressure at the so-called "blow-out" sites. Ligation of the long saphenous is performed ideally at the femorosaphenous junction, along with division of all tributaries encountered at this site. "Blow-out" sites lower in the leg require separate division below the lowest competent vein valve.

In the intelligent use of the tourniquet following the principles of the Trendelenburg test, rests the



Fig 1. Radiograph with hippuran. A case showing secondary "blow-out" point below knee. Accessory branches are seen to be the cause of secondary dilatation.

key to the discovery of the various "blow-out" points. Undue inflammatory reaction following combined ligation and injection can be prevented by a second ligation, lower in the leg, to limit the extent of the vein affected by the sclerosing solution.

If the principles of combined ligation and injection as outlined in this paper are followed, the treatment of varicose veins should remain simple, ambulatory, and attended by a minimum of recurrence.

HERBERT F. THURSTON, M.D.

Ochsner, A., and Mahorner, H. R.: The Modern Treatment of Varicose Veins. *Surgery*, 1937, 2
889

The authors' study is based upon 285 cases of varicose veins of the lower extremity among 9,000 patients admitted to the Hutchinson Memorial Clinic.

of Tulane University 247 of whom were females. Of the 247 females 152 were treated in the Department of Obstetrics. The ratio of females to males in the entire series was 6.5 to 1 and the ratio of non pregnant females to males was 2.5 to 1. Of the 247 females with varicosities 62.6 per cent were pregnant. The average age of the males with varicose veins was forty eight and one tenth years and of the non pregnant females forty seven years whereas the age of the pregnant females with varicosities was thirty and six tenths years.

Of the 100 patients treated in the Department of Surgery, the circulation of the varicosities of the lower extremity was examined by three methods (1) the Trendelenburg test (2) the Perthes test and (3) the combined tourniquet test previously described by the authors. The last test consists of observing the effect of walking on the filling or emptying of the varicosities and then placing a tourniquet at the upper, middle and lower portions of the thigh respectively, following which observations concerning the filling of the varicosities are made. In the cases in which the combined tourniquet test was used 33 per cent had incompetence of the communicating veins as well as incompetence of the valves of the long saphenous vein whereas in only 20 per cent was the doubly positive Trendelenburg test present.

The treatment of varicosities by injection alone has been disappointing particularly in patients with large varicosities, because of their tendency to recur. There were 72 cases in which satisfactory results for comparison of the various methods could be observed. In 38 of the 72 cases ligation and dissection of the vein were combined with the injection treatment. In the remaining 34 the injection treatment alone was used. In each instance 5 per cent sodium morrhuate was employed. Generally 2 c.c. of the solution were injected at one place which usually resulted in thrombosis in an area varying from 2 cm. to 6 cm. or 9 cm. in length. Two or three injections were made. The injections were repeated at intervals of from five to seven days. A total of 55 ligations were performed in 38 patients. In 24 high ligations were done at the fossa ovalis and at the upper end of the internal saphenous vein above any of the tributaries. Twenty six extremities were operated upon in the 24 patients. In 17 only high ligations of the internal saphenous vein were done in addition to the high ligation on one side. In 14 patients the ligations did not include high ligation of the internal saphenous vein but other operations for section and ligation of the veins were done. It has been the authors' experience however that there is definite danger of recurrence unless high ligation is done.

In considering the type of therapy in the individual case if the valves of the internal saphenous system are found to be incompetent if the Trendelenburg test is positive, and if improvement is secured following application of the tourniquet at the upper middle and lower thirds of the thigh ligation is recommended. In the milder cases of varicosities in

jection treatment alone is used. A ligation should always be done high above all the tributaries of the saphenous system because the authors have observed recurrences when the ligation of the saphenous vein was performed in the middle and lower thirds of the thigh. Cases of moderate or severe varicosity as selected by the comparative tourniquet test should have ligation and dissection below the level of the lowest communicating vein of the thigh with incompetent valves in addition to high ligation of the internal saphenous vein.

Ligation is done as an ambulatory procedure through a longitudinal incision 2 cm. medial to the femoral artery and 2 cm. below Poupart's ligament. The external pudendal vein is also ligated along with the internal saphenous. Following ligation the saphenous vein is divided and 2 c.c. of 5 per cent sodium morrhuate are injected into the distal segment. Ligation should be done by means of transfixion. The patient is instructed to be ambulatory as it is believed this encourages circulation in the deep veins of the lower extremity and helps prevent propagation of the thrombus through the collateral veins of the deep system. In cases in which the comparative tourniquet test shows that the patient has a leak not only through the main opening of the internal saphenous veins but also through the communicating veins through the deep and superficial systems the internal saphenous vein is also ligated at that point where the test shows that there is the greatest amount of improvement.

In a comparison of the results obtained from the injection treatment and those obtained from ligation and injection it was found in a follow up that the incidence of recurrence in the first group of patients was 57.5 per cent, whereas in the latter group it was 18 per cent. In those patients on whom ligation alone was done the incidence of recurrence was 50 per cent.

Collens W. S. and Wilensky N. D. Intermittent Venous Occlusion in the Treatment of Peripheral Vascular Disease. An Experience with 124 Cases. *J. Am. M. Ass.* 1937 109: 2125.

In attempting to determine the mechanism responsible for the clinical benefits obtained from constructive hyperemia, Lewis and Grant found that during the period of venous congestion produced by the application of a tourniquet, there occurred an increase in the arterial amplitude in their plethysmographic tracings. More important however was their observation that when the constricting band was released an increase in arterial flow much out of proportion to the original resting period resulted. This they called reactive hyperemia. Circulatory arrest for a period of fifteen minutes would effect an increase in flow of as much as 600 per cent after release.

The authors recognizing the above facts decided to apply the principles in the treatment of peripheral vascular disease. This was done by the construction of an apparatus which automatically produced in

mittent periods of venous compression and release of the compression. The apparatus was connected to a pneumatic cuff which embraced the proximal portion of the extremity. The cuff was inflated to a pressure necessary to constrict the veins and was then released. This cycle was then continuously repeated so that the final result consisted of alternating periods of venous congestion. The authors stress the fact that this method is not to be confused with the use of alternate suction and pressure in the treatment of the same type of diseases.

The remainder of the article deals with results of this form of therapy. The authors have treated a series of cases of thrombo-angitis obliterans, arteriosclerosis obliterans (non-diabetic), arteriosclerosis obliterans (diabetic), and acute arterial occlusion. The results are given in several tables.

PAUL MERRELL, M D

BLOOD; TRANSFUSION

Guassardo, G.: Blood Dyscrasia with Osseous Alterations (Emopatie con alterazioni ossee) *Minerva med.*, 1937, 28 672

The author reports a case of blood dyscrasia in a five-year-old girl of healthy parents. Born in normal labor, the patient's early history was found to be essentially negative. The newborn child was of normal weight and was breast-fed. The patient was well up to the age of six months when the mother noticed marked loss of weight and signs of malnutrition. This was accompanied by a marked facial pallor. At the age of ten months, the child had moderate elevations of temperature at various times and a physician diagnosed an anemia which was treated with arsenic.

At the age of two, the child was brought to the clinic with a fracture of the left femur which she sustained after an insignificant fall. At that time the physician reconfirmed the diagnosis of anemia.

For the last three years the child's condition did not improve, she presented a marked pallor, general asthenia, and anorexia. During the week previous to her admission to the clinic, the child presented a dry hacking cough, slight dyspnea, and a moderately elevated temperature.

Upon physical examination, the patient's state of nutrition was found to be poor and the mucous membranes were markedly pale. The skeletal system revealed the presence of long and thin bones, especially in the lower extremities.

Examination of the chest revealed subcrepitant râles over the entire pulmonary areas on both sides. There was a marked systolic murmur heard over the entire precordial area. The second pulmonary sound was accentuated.

The liver and spleen were found to be enlarged. The child died seventeen days after admission to the clinic. No autopsy could be performed.

The red-blood count a week before death was 1,390,000. The hemoglobin was 29 and the color index 1.1. The cells showed anisocytosis, poikilocytosis, and polychromatophilia. The nucleated red-cell count was 11,300. The white-cell count showed 4,600 polynuclears, 4,800 mononuclears, and 240,000 platelets. Three days before death the red count was 1,110,000 and the hemoglobin was 30. The number of nucleated red cells was decreased to 9,600.

Röntgenological examination of the skeleton revealed rarefaction of the bones in various places. Clinically, therefore, the case was characterized by an erythroblastosis, hyperhemolysis, and osseous alterations of the osteoporotic type.

The author states that in the literature, conditions involving both the blood and the bones have been described under a variety of names. Among these, the best studied are Cooley's erythroblastosis, Albers-Schoenberg disease, Hand-Schueller-Christian's syndrome, Niemann-Pick's disease, and Gaucher's disease.

In Guassardo's opinion this classification is impracticable because some of the cases run an atypical course and can therefore be classified only with difficulty. Although this present case probably represents one of Cooley's erythroblastosis, the absence of some of the symptoms and the atypical course make one doubtful. The author has therefore classified this condition on the basis of anatomicopathological criteria and has named it an "erythremic osteoporotic anemia."

RICHARD E. SOMMA, M D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Westberg V. A Statistical Study of the Fatalities from Pulmonary Embolism During the Years 1922 to 1934 Inclusive. Also of the Thromboses in the Year 1934 (statistische Zusammenstellung der Todesfälle an Lungenembolie während der Jahre 1922-1934 sowie der Thrombosen im Jahre 1934) *Uppsala Laekaref. Forh.* 1937 43 101

Thrombosis with or without pulmonary embolism often prolongs the course of the disease and an embolus may even be fatal. Its unexpected appearance apparently without cause raises many questions, such as what is the essential nature of the thrombus which biological processes lead to the formation of a thrombus and its growth and what force tears the thrombus from its original site. None of these questions has been definitely answered.

Thromboses have been classified as follows: (1) local wound thromboses, (2) septic thromboses, (a) venous (b) cardiac, and (3) progressive distant thromboses in the large veins. A sharp distinction is drawn between thrombophlebitis and thromboses. Distant thromboses owe their origin and structure to obstructions in the circulatory bed such as venous valves and vessel branchings which give them a characteristic histological picture and makes it possible to definitely exclude the relatively harmless cases of thrombophlebitis.

The author's material consists of 104 fatalities from pulmonary embolism and thromboses from the Surgical Division of the University Hospital at Uppsala, excluding cases of definite thrombophlebitis. Of these 75 were postoperative and 29 non postoperative. Of 70 thromboses in the year 1934, 49 were postoperative and 21 non postoperative. The number of patients operated upon from 1922 to 1934 amounted to 19,574; those not operated upon to 18,055 which gives a mortality from pulmonary embolism of 0.38 and 0.16 per cent in the two groups respectively. The thromboses in 1934 were also more numerous following operation (1,856) than in the absence of operation (1,667); the thrombosis morbidity was 2.63 per cent for the former and 1.79 per cent for the latter. Fatalities from pulmonary embolism often occur without even the existence of a thrombosis being suspected. In 80 cases (76.92 per cent) the embolus occurred without warning and in only 24 cases (23.08 per cent) was the preceding thrombus confirmed or suspected. The clinical diagnosis of pulmonary embolism was made in 88 cases at autopsy and the site of the primary thrombus was found in 52 cases.

As to etiology the literature does not differentiate between thrombosis and thrombophlebitis which is a grave mistake. The latter occurs in the superficial and sinuous veins in contrast with the thrombosis

which is localized in the straight and deep veins. Most authors cling to the infection theory in which three factors are necessary: endothelial injury, blood changes, and changes in the blood stream, peculiarly retardation. There is disagreement however as to the importance of the individual factor.

Do any factors especially predispose to the formation of thrombosis and pulmonary embolism? Persons up and about very rarely develop distant thrombosis which usually occurs as a complication of previous disease. The different factors seem to be of varied importance. Surgeons usually think of the operative trauma but other causes include the primary disease, age, sex, and the social position. The author believes that operative trauma is a predisposing factor in thrombosis and pulmonary embolism. Any operation even though relatively insignificant attacks the biological life of the body but it is difficult to decide which tissue and organic system is injured most. Tissue necroses, hemorrhage and other operative traumas leave their traces on the constitution of the blood. Morphologically, the erythrocytes show no change except great loss of blood; the leucocytes show an increase in number and displacement to the left; the thrombocytes show immediate decrease in number followed by a slow rise. Chemico-biologically, the globulin albumin quotient is disturbed by an increased amount of globulin and the fibrinogen is increased. The postoperative increase in globulin predisposes to thrombus formation. The other blood changes include an increase in the residual nitrogen, creatinin and acidosis but cholesterol shows no change or a decrease but never an increase. Of the blood reactions, sedimentation is accelerated and viscosity and coagulability are increased. A diminished rapidity of the blood stream is an important causative factor in thrombosis.

Statistics show that thrombosis and pulmonary embolism occur more often after spinal anesthesia than after other methods of anesthesia but this result is misleading because spinal anesthesia was used mostly in very debilitated and old patients in whom thrombosis is dangerous.

Certain operations seem to be followed by thrombosis and pulmonary embolism more often than others, especially those below the diaphragm. Taking the diaphragm as the dividing line, the author found 70 pulmonary emboli in 18,612 operations (0.38 per cent) above it and 1 embolus (0.06 per cent) below it. Opening of the peritoneum results in meteorism and diminished lowering of the diaphragm on respiration and leads to thrombosis because of the poorer circulation. Among 14,033 laparotomies there were 48 pulmonary emboli (0.34 per cent) while in 6,129 there were 23 (0.39 per cent) emboli which figures show practically no difference.

The greatest number of the fatalities from pulmonary embolism occurred between the fourth and

tenth days, most of them on the seventh, while the thrombosis occurs most often on the fourth and fifth day, but may occur at any time up to the fifty-second day.

The importance of the primary disease cannot be definitely determined. Clinical experience shows that markedly debilitated patients are more prone to develop these complications. There was a difference of 1.38 per cent between the incidence of these complications in tumors (1.78 per cent) and in diseases of the digestive organs (0.40 per cent), the difference between the incidence in tumors and in all fractures was 0.51 per cent. None of 400 patients operated upon for thyroid diseases showed a fatality from pulmonary embolism. Cardiac and vascular diseases favor the development of thrombosis and pulmonary embolism.

There is no marked difference in the incidence of these complications in the sexes. With increasing age the danger of thrombosis and death from pulmonary embolism increases. The mortality in private pavilions is about double that in general wards, on account of the greater age of the patients in the former.

In 23.08 per cent of the cases, pulmonary embolism followed a known cause, such as arrangement of the bedding, getting out of bed, or some other motion of the patient. In 76.92 per cent of the cases the embolus appeared without any such demonstrable cause; the patient may have sat up, turned in sleep, or simply not followed instructions to lie quietly. Of all the patients, 64.6 per cent died within a half hour, and 89.2 per cent within one day.

LOUIS NEUWELT, M D

Ettinger, A.: "Plate-Like" Atelectasis of the Lung.
Ann Int Med, 1938, 11: 1296

Small areas of pure atelectasis without complicating secondary changes in the parenchyma are represented in the roentgenogram by "plate-like" shadows in the lung, which appear as horizontal stripes in both postero-anterior and lateral views (Fleischner). Previously, such horizontal stripes frequently have been mistaken for fibrinous deposits on the pleura. Fleischner observed these stripes associated with three groups of conditions:

- 1 Abdominal diseases
 - 2 After contusions of the chest
 - 3 Minor upper respiratory infections
- By autopsy controls, he demonstrated that these plate-like shadows were due to small atelectatic areas.

The author observed the development of these shadows during the reexpansion of a lobar infectious atelectasis in a number of children with typical acute lobar collapse due to upper respiratory infection. The horizontal stripes appeared in the roentgen-ray film during the stage of re-inflation. They represented at this time the only abnormal finding. Clinically, the health of the patient seemed to be fully restored.

A case of acute lobar collapse due to upper respiratory infection is reported in which, in the end stage

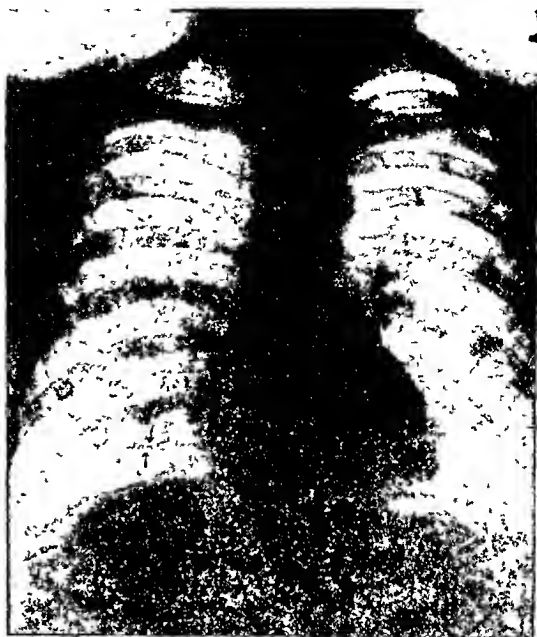


Fig 1 Arrows indicate a horizontal shadow stripe in the right lower lobe, which represents "plate-like" atelectasis.

of reexpansion, thin horizontal shadow stripes were seen in the area previously collapsed, and were interpreted as "plate-like" minute areas of atelectasis which were caused by the occlusion of small-sized bronchi.

In the differential diagnosis, pleural adhesions alone have to be considered. The appearance of the atelectatic areas as thin stripes in both the anterior and lateral films makes it obvious that we are dealing with a plate-like and not with a linear structure. The intrapulmonary origin is therefore evident.

Fleischner explains the appearance of these plate-like shadows by a mechanism which he calls "directed collapse." While in pneumothorax the lung can retract from the lateral chest wall, because of the change of pressure within the chest cavity, conditions for collapse in obstructive atelectasis are fundamentally different. In this condition the lung cannot retract from the chest wall. Even if no pleural adhesions are present, the negative pressure acts as an adherent force between the surface of the lung and the chest wall and prevents the collapse of the lung toward the hilus. As there is no possibility for the lung to shrink in a costomediastinal direction, as in pneumothorax, the tendency of the atelectatic area to diminish in extent can take place only in a craniocaudal direction, perpendicular to the axis of shrinkage in pneumothorax.

JOHN H. GARLOCK, M D

ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Schmidt H. The Serum Prophylaxis of Tetanus
(Zur Serumprophylaxe des Tetanus) *Wied. Hefte*
1937 604

Tetanus bacilli are found less frequently in the earth than Fraenkel bacilli. Just like diphtheria bacilli, not every tetanus bacillus forms the same amount of toxin. Traumatic tetanus although of varying frequency in different areas, may be carried with modern transportation to areas heretofore uninfected. Therefore every transportation injury must be considered as infected. The nature of the wound has no significance. It may appear very slight and superficial but nevertheless surgical wound disinfection is one of the most important prophylactic factors. The omission of the prophylaxis with serum is a grave mistake in all street injuries and soiled wounds. It should be used as soon as possible and the longer the interval after the accident, the greater must be the amount of the antitoxin. Formerly 20 German antitoxin units were given. Such a unit corresponded to 150 of the International units. At the present time from 250 to 3000 International units are given. Among the sera, there are now available 500-fold and 2000-fold horse serums of which 5 and 25 c.c.m. respectively are necessary for prophylactic purposes. There is also a cattle serum of from 250 to 500-fold of which 10 and 5 c.c.m. respectively represent the necessary protective amounts. A 500-fold horse serum with only 5 per cent albumin may be obtained also.

Serum sickness must in no case be a hindrance to the prophylaxis. It occurs in from 30 to 40 per cent of the cases and depends upon the reaction of the individual. It may be prevented in several ways: (1) the Rother auto-blood injection of 30 c.c.m. of venous blood within the first twelve to twenty-four hours possibly with the addition of sodium citrate 15 c.c.m. of a 3.8 per cent solution for each 10 c.c.m. of blood; (2) by the injection of 10 c.c.m. of serum from a person who from four to eight days previously has undergone serum sickness before the tetanus serum injection of Panzart and Levy; and (3) by the procedure of Buzello in which at the beginning of the disease from 2 to 5 c.c.m. of the same serum are injected immediately. This is not quite harmless in persons who have previously been given any kind of serum injection as the Arthus phenomenon may appear. The best and simplest remedy is the use of the somewhat expensive 2000-fold horse serum or of serum poor in albumin. Serum sickness is not avoided by a previous desensitizing injection; such an injection can prevent only shock. Anaphylactic shock should be avoided under all conditions, and to this end the following are important: (1) a carefully taken history to determine whether any kind of serum injection has been given before or whether there is a tendency to asthma, hay fever, urticaria, migraine and edemas in the patient himself, or his parents, his brothers and

sisters; (2) the testing for hypersensitivity either by the eye or skin test. In the eye test 1 drop of the serum diluted 1 to 10 is dropped into the conjunctival sac. Within from one half to two hours there results itching, lacrimation and edema of the lid. In the skin test an intracutaneous wheal is made with the serum diluted 1 to 10 c.c.m. Within ten minutes there results a wide wheal with extensive erythema in the vicinity with characteristic pseudopod-like processes in the adjacent area. There are persons who do not tolerate horse serum and to these cattle serum must be given. The desensitization is carried out by the technique of Besredka by injecting from 0.5 to 1 c.c.m. subcutaneously and only after three or four hours the necessary amount, namely the 2000-fold horse serum or cattle serum is injected. In conclusion the author recommends the active immunization against tetanus by means of an aluminum hydroxide adsorbed tetanus toxoid. Rodenwaldt has never seen a serious injury from the prophylaxis in the tropics.

Zessler reports that fatalities from serum disease and anaphylactic shock are extremely rare. With the extensive travelling and the possibility of previous infection of the skin with tetanus spores only little consideration should be given to the fact that the particular region in question is not infected. In the presence of foreign bodies such as wood splinters, injections should always be given also in secondary operations of old injuries as the spores may be viable after twenty years or more.

Buerkle de la Camp claims that if a wound can be entirely excised within ten hours the injections need not be given. If, however, an excision is not possible only a toilet can be made or if the wounded patient comes later than ten hours after the accident, an injection must be given. Even slight injuries unfortunately often produce an infection. He never saw a fatality.

Hempel claims that injection should be given after wound excision within from six to eight hours and rivanol 1 to 1000 should be injected in all wounds soiled with street dust, dung, wood and garden soil and in barefoot walkers with injuries. The smallest and superficial scratch wounds of the skin are dressed with balsam of Peru. After eight hours he also excises a wound but gives a double dose of tetanus antitoxin. In old war injuries 1 c.c.m. of cattle serum is always given during the operation under anesthesia and four hours later the proper dose is slowly injected. Serum sickness is relatively rare. In one case the patient's own blood helped. A paralysis was seen once. Anaphylactic shock was never seen. (FRANCE) LOUIS NEUWELT M.D.

ANESTHESIA

Poulhiquen E. General Anesthesia with Sodium Eripan (Anesthésie générale à l'éripan sodique)
Mém. Acad. de chir. Par. 1937 63 117

Poulhiquen notes that intravenous anesthesia is but little employed in France as compared with its

more widespread use in other countries. In the past three years, he has employed sodium evipan, given by intravenous injection, as the anesthetic for 2,300 operations. Most of these operations were of relatively short duration. In these 2,300 operations serious symptoms developed in a few cases and there were 2 deaths which may be attributed in part to the anesthesia. One death occurred in a man seventy-two years of age operated upon for intestinal obstruction, local anesthesia was used, but a small dose of evipan was also given, which was a mistake. The second death occurred in a woman, who was an alcoholic, when evipan was employed for a curettage. In this case too large a dose of evipan was employed, especially because evipan is undoubtedly dangerous to alcoholics. Evipan was often used for patients who were in a poor condition, when the author would have hesitated to employ any other form of general anesthesia.

The author considers evipan, given in a single injection for operations of short duration, a safe and simple anesthetic in most cases. The administration of evipan by repeated injections for longer operations is a different matter. This requires a skilled anesthetist and a careful technique. He has used this method, however, for gastrectomy in 6 cases with very satisfactory results, in these cases a small amount of numal was added to the evipan.

When evipan is employed by the usual technique, the patient usually goes to sleep quietly in a few minutes after the injection. Usually a dosage of from 6 to 10 c cm is required, but some patients do not need more than 1½ or 2 c cm. In most cases the patient is quiet—the author observed restlessness or agitation in only three or four cases—and awakes without malaise. However, the patient should not be allowed to move about immediately, even after minor operations under evipan.

Evipan can also be used to good advantage to supplement other methods of anesthesia, either before or after the other anesthesia is given. If used before the other anesthetic, the dosage required of the latter is definitely reduced, the patient's anxiety and the sensation of suffocation with inhalation anesthesia are relieved. Evipan can also be given at the end of certain operations, especially when local or spinal anesthesia is not quite sufficient to bring the operation to a close.

A very small dose of evipan can be employed for such minor surgical procedures as the incision of an abscess, and removal of adherent dressings. With the usual dose, giving a deeper anesthesia, it can be employed for such procedures as uterine curettage, cleansing and suturing of traumatic wounds, cys-

totomy, prostatectomy, drainage of some cases of pleurisy, ileostomy, and for some operations for appendicitis. For the latter operations some supplementary anesthetic may be required. Evipan is especially valuable for the treatment of injuries, including the reduction of fractures. The author suggests that this use of evipan may prove very valuable in war surgery.

ALICE M. MEYERS

Bloch, J. C., Rolland, P., and Vieillefosse, R. Intravenous Injection of Scopolamine, Morphine, Narcotine, and Ephedrine, as a Supplementary Analgesic in Local Anesthesia (Injections intraveineuses de scopolamine, morphine, narcotine, éphédrine, analgésie complémentaire de l'anesthésie locale). *Anes. et anal.*, 1937, 3: 484.

In animal experiments, Bloch and his associates have shown that the depressive effects of a mixture of scopolamine and morphine on the respiration and circulation can be counteracted by a subsequent injection of a mixture of narcotine, which stimulates the respiratory center, and ephedrine, which acts primarily on the cardiovascular system. When the four drugs were combined in a single injection, the respiratory rhythm and blood pressure were but slightly modified, unless injections were often repeated. The animals recovered promptly from the effects of even repeated injections.

The authors have used intravenous injections of this combination of drugs as a supplement to local anesthesia in 48 cases with good results. The mixture used contains 5 mgm morphine, ½ mgm scopolamine, 25 mgm each of ephedrine and narcotine per 2 c cm. The intravenous injection is given slowly, it takes about two minutes. An injection of from 1 to 2 c cm is given half an hour before operation, if the patient is not asleep or complains during the course of the operation (under local anesthesia) a second injection may be given, but the total amount used should not exceed 4 c cm. While too large a dose induces complete loss of consciousness, it may make the patient restless and agitated, especially at the time of suturing the wound, so that the use of a small amount of a general anesthetic may become necessary. This occurred twice in the authors' experience.

As a rule, the patient is quiet after the injection, and shows a tendency to go to sleep, this is not an "anesthetic sleep," as he rouses sufficiently to answer questions. The blood pressure shows little change, the pulse may be somewhat accelerated but remains strong and of good quality throughout the operation. The postoperative recovery is usually excellent, as is the rule under local anesthesia. ALICE M. MEYERS

PHYSICO-CHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Ratti A. The Radiological Picture of Malignant Lymphogranuloma of the Lung (Il quadro radiologico del linfogranuloma maligno del polmone) *Radiol med* 1937, 24 907

Ratti states that malignant pulmonary lymphogranulomatous lesions have been described anatomicopathologically and roentgenologically but the literature on this subject is very scarce.

Anatomicopathologically and pathogenetically lymphogranulomas are to be considered as inflammatory lesions caused by an unknown agent. Any organ may be affected but those organs which contain elements belonging to the reticulo endothelial system are involved especially.

In the lung like in other parenchymatous organs a malignant granuloma presents itself in the form of nodules or masses of various sizes. The surrounding parenchymatous tissue is undergoing exudative proliferative and sometimes also degenerative changes. Morphologically these lesions may be classified into (1) nodular mediastinobronchial lesions with direct involvement of the lung or involvement by way of the hilus through the medial pleuro-pulmonic surface (2) nodular mediastinobronchial lesions with extension into the lung by the peribronchial or intrabronchial route (3) diffuse pulmonary infiltrates with more or less lobar distribution and with involvement of the bronchomediastinal lymph glands (4) circumscribed and confluent lobular lesions with involvement of the lymph glands and (5) diffuse pulmonary lymphohematogenous lesions involving the lymph glands primarily.

The last form occurs most rarely. From a radiological point of view malignant lymphogranulomatous lesions of the lung are classified by Ratti into (a) infiltrating mediastinopulmonary forms and (b) forms with isolated pulmonary foci associated or unassociated with a tumor of the hilus or the mediastinum.

The infiltrating mediastinopulmonary forms are most frequently encountered. Generally speaking the roentgenological picture reveals a more or less extensive pulmonary opacity which is continuous with the mediastinal shadow and is altered by the presence of more or less well distinguishable lymphoglandular nodes. This type of roentgenological picture may be encountered in various phases of this condition.

The forms with isolated pulmonary foci occur less frequently in the author's experience. In the majority of the cases the roentgenological picture reveals multiple nodules of various sizes. It is rare to find only an isolated single pulmonary focus although such cases have been described in the literature. It is also very rare to encounter multiple minute foci scattered over the entire pulmonary area. In the

presence of milary lesions the roentgenological diagnosis is considerably difficult and the condition is easily confused with milary tuberculosis.

In the author's material no cases with the formation of cavities and bronchiectasis have been observed although some investigators have described their presence in this condition. Ratti has observed however in many cases the presence of pleural lesions in the form of moderately extensive effusions and adhesions at the site of the lymphogranulomatous lesions.

After having compared the results obtained from roentgenological examination with the anatomicopathological findings the author discusses the differential diagnosis which includes primarily bronchopneumonia, lobar pneumonia and pulmonary tuberculosis.

Concerning the prognosis Ratti believes that the multiple nodular forms are especially resistant to irradiation and therefore particularly dangerous.

RICHARD F. SOMMA, M.D.

Overend T. D. The Significance of Appendix Radiology *Brit J Radiol* 1937 10 839

During recent years the rational interpretation of signs revealed by the roentgen examination of the appendix has not altogether kept pace with technical improvements. The importance attached to these signs in establishing the diagnosis of chronic appendicitis varies widely. The vague and elusive current clinical and pathological concepts of appendiceal disease are largely responsible for the lack of a satisfactory guide to the comprehension of the roentgen findings. The solution lies in promoting this examination to a scientific procedure based upon an understanding of underlying principles.

With this in mind the author discusses the physiology, etiology and pathogenesis, clinical features and appendix radiology at some length. He cites concepts advanced by various authors which tend to show that this organ probably aids in coping with sepsis in the alimentary canal. Intrinsic infections, abnormal excitation of the abdominal sympathetic system resulting in vascular spasm, involutary changes and social environment may contribute to perversion of the normal function. Adhesions, scar tissue formation and other changes demonstrable by biopsy probably represent defense reactions.

Acute appendicitis is generally regarded as being outside the sphere of roentgenological investigation. This holds true as far as the use of contrast media is concerned but plain roentgenograms may serve to prevent diagnostic errors by revealing other etiological factors such as urinary concretions which may cause similar symptoms.

Chronic appendicitis is not accepted as a disease entity generally but is variously interpreted as representing the after-effects of an acute attack or

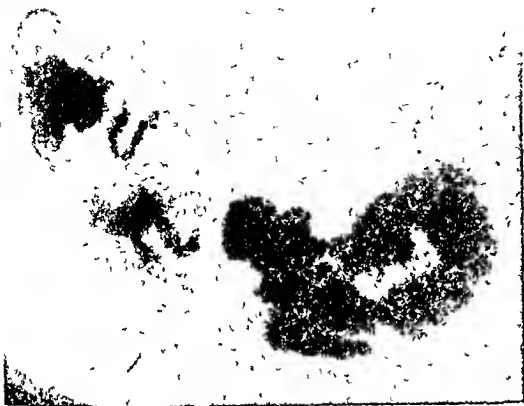


Fig 1 Woman, eighty-two years of age. Severe abdominal pain and vomiting for some months. Pain was centralized on right iliac fossa and umbilicus. Pain increased by solid food. Barium meal showed well-marked "cardiospasm" and esophageal delay. The appendix is seen to be extremely long, to have a kink or obstruction in its middle, its proximal half is dilated, and its distal half narrowed. Much tenderness on palpation.



Fig 2 Woman, fifty-three years. For three years attacks of "secondary dyspepsia" with nausea and some vomiting. Appendix seen to be long, tortuous, and with a terminal filling-defect, tender and fixed on palpation. No gastric abnormality seen. Typical chronic appendicitis with "appendix-dyspepsia."

being in the nature of recurring attacks with a residual chronic infection. These cases frequently present problems of differential diagnosis in which the roentgen examination may be of great value by demonstrating pathological changes produced by the diseased appendix or revealing other or associated lesions which may have an important bearing on the symptomatology.

The roentgenological aspects of appendix examination are discussed relative to direct signs produced by intrinsic changes in the appendix and secondary changes of a morphological or functional nature referred to as indirect signs. Technique is discussed briefly in connection with both the opaque meal and enema methods of examination, and special procedures are mentioned which have been advocated to improve the results. Attention is called by the author to the advantages to be derived from an examination by means of the enema during the subsidence of a subacute attack, at which time positive findings may be elicited which are less obvious at a later period.

Of the direct signs, luminal changes in the form of irregular narrowing, dilatation, or imperfect filling are the most important. Segmentation is of trivial importance as it may be due to active contraction. Filling defects due to coproliths or other causes are also negligible as they are usually accidental. Stasis of the appendix may be due to an organic cause, but it occurs also in normal cases and its presence as a

predisposing factor deserves consideration. Non-visualization as a sign of pathology is discussed. Attention is called to various conditions in which it may have diagnostic value and others in which it is merely an accidental finding.

Many indirect signs have been described as being due to chronic appendicitis, but the etiological relationship of some of them is questionable. Most of them should be evaluated in correlation with the clinical manifestations. Localized tenderness over a visualized appendix is usually considered of definite value, but even in the absence of such a shadow tenderness around the cecum may be significant. Demonstrable fixation, kinking, or malposition may all be due to adhesions from a previous attack of appendicitis and may have an important bearing on the diagnosis. Elongation of the cecum or ascending colon, chronic volvulus of these parts, deformities and mucosal pattern variations of the cecum, ileal kinks, and calcification of the ileocecal group of glands are mentioned as morphological signs of importance. Among functional changes, ileocecal stasis, inhibition of the gastro-ileus reflex, ileal spasm, pylorospasm, and evidences of spasticity of the colon are stressed as being of value in some cases.

The importance attached by different authors to the signs mentioned is cited. Commonly this is in accord with their conception of what constitutes

chronic appendicitis. Some authors have grouped several of these signs as syndromes characteristic of the condition. Overend has made no attempt to draw definite conclusions but believes that the tentative deductions made by him demonstrate that there are principles on which a trustworthy examination of the appendix may be based.

ADOLPH HARTUNG M D

Herniman Johnson F. The Place of X rays in the Treatment of Certain Forms of Chronic Arthritis. *Brit J Radiol* 1937 10 765

Roentgen therapy has been found to be of definite value in certain forms of chronic arthritis but comparatively little has been done to classify the particular forms amenable to such treatment. Believing this to be essential for statistical purposes the author gives a detailed clinical and radiological description of those forms in which roentgen rays should be given a trial. For the limited purpose of arriving at a prognosis he classifies joint lesions into monarthritides and polyarthritides and divides the former into hypertrophic and infective forms.

He has found roentgen therapy especially valuable in hypertrophic cases except in the degenerative types affecting very old individual in whom it is valueless. Even when the involved joint presents well marked changes and these remain stationary or appear to progress during treatment there may be definite improvement clinically providing no predisposing factors are left out of account and the treatment is persisted in sufficiently.

The affected joint is given 150 roentgens twice a week for three weeks (first series). If some lessening of pain results the same treatment is continued for a further three weeks. If however no relief at all occurs the dosage in the second series of treatment may be increased to 300 roentgens per sitting. The author uses 180 kv. 0.5 copper filter 40 cm. a.k. skin distance a field of from 25 to 30 cm. in diameter and anteroposterior, postero-anterior and lateral areas. At least 2 more full courses of 12 sittings should be given at interval of three months no matter how well the patient feels and thereafter less frequently for from two to three years. If improvement at the end of six weeks is small or absent

it is nevertheless desirable to persist as some cases showed real relief only after eight or nine months.

In cases of infective arthritis the dosage must be very carefully graded according to the amount of active inflammation present. In the chronic stages the same dosage may be used as in the hypertrophic form. Temporary improvement is perhaps the rule but genuine arrest is hard to attain.

In polyarthritides roentgen rays applied locally to individual joints may give some temporary relief but the progress of the disease is not checked.

ADOLPH HARTUNG M D

MISCELLANEOUS

Hartman F W. Lesions of the Brain Following Fever Therapy. Etiology and Pathogenesis. *J Am M Ass*, 1937 109 2116

This study was undertaken in order to determine whether the lesions produced during the course of artificial fever therapy were due to asphyxia or anoxia. The material was from 1 human being who died and 15 experimental animals. In the latter careful blood studies were carried out which showed that there was marked diminution of the oxygen content of the animal's blood viz. the arterial blood showing an oxygen content of 15.59 per cent, an oxygen carrying capacity of 26.65 per cent, or an oxygen saturation of 59 per cent.

The minute cellular changes and the areas of necrosis observed in these brains after fever therapy are the histological changes observed after cerebral anoxia produced by ligation of the blood vessels, carbon monoxide poisoning and asphyxia. Contributing factors to the anoxia include alkalosis of the blood due to rapid respirations, increased temperature of the blood with decreased oxygen saturation, increased basal metabolism with increased oxygen demand on the part of the tissues and very rapid flow of the blood through the tissues so that the oxygen is not given up in passing.

To combat these factors the use of oxygen during the period of treatment is recommended. It should be given by nasal catheter and in order to combat the alkalosis combinations of oxygen and carbon dioxide are suggested. JOHN WILTSIE ELLON M D

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Hicks, Sir S : The Physiology of Acute Circulatory Failure Due to Hemorrhage and Shock *Australian & New Zealand J Surg*, 1937, 7 99

The author quotes Holt's definition of primary shock as a circulatory collapse due to inhibition of constrictor tone by influences operating throughout the central nervous system. It is rapid in onset and associated with a fall in the blood pressure but without a decrease in the blood volume. So far as secondary shock is concerned, Holt summarized Blalock's work, ascribing the condition to a reduction of the blood volume due to loss of blood and/or plasma into the injured tissues, which lead to a decreased cardiac output and a fall in the systemic pressure. Prolonged vasoconstriction may further reduce the blood pressure and so establish a vicious circle. The difference between primary and secondary shock is so clear cut in a period of time as to offer no difficulty in differentiation.

The author goes on to give an excellent review of the pathological physiology of shock. He calls attention to the importance of the depot function of the spleen, great veins, and subpapillary plexus of the skin, as well as the importance of the pulmonary circulation in serving as a buffer depot, between the right and left sides of the heart. The fundamental physiology of cardiac output is carefully reviewed. The importance of an effective coronary blood supply is stressed inasmuch as cardiac muscle unlike skeletal muscle is unable to go into temporary "oxygen debt." The clinical signs of primary and secondary shock and hemorrhage are discussed in some detail. The important literature on the subject of the physiology of these conditions is reviewed.

The principles underlying the treatment and prevention of shock of hemorrhage are the maintenance of the circulatory blood volume, the avoidance of extra demands upon the circulation, and the mitigation or avoidance of any influence likely to stimulate the sympathetico-adrenal system or to undermine the metabolic resistance of tissue cells. One of the most important factors under the first heading is dehydration. The large fluid loss from the body in the form of invisible perspiration and by water vapor from the lungs, as well as that resultant from intestinal disturbance must be considered. Such losses should be added to the blood or plasma loss. The osmotic pressure of the plasma protein should be restored with blood or imitated by gum saline solution. Under the second heading must be considered measures to insure warmth and to prevent any movement due either to pain or apprehension. Quiet is essential. It is necessary to prevent heat loss but not to heat the patient. Attempts to raise the blood pressure temporarily by a vasoconstrictor

are not only unnecessary in secondary shock, but unfavorable. The important thing is to restore to the heart a good venous return. In primary shock, however, these measures are quite justified. The decision as to when to use morphine must be based upon clinical experience, the powerful depressant effect of the drug upon the respiratory center being kept in mind. The intravenous use of strophanthin or of digitalis is manifestly of no value. Most rigid hemostasis must be observed because further loss of blood may very suddenly precipitate the subject into a condition of severe shock.

HAROLD C OCHSNER, M D

Meyer, A W : Use Destruction in the Human Body. *California & West Med*, 1937, 47 375

Observation of the effects of friction upon the hair, nails, skin, and teeth is inescapable, but the internal evidences of attrition have been largely overlooked. This neglect is ascribed by the writer to the fact that anatomists alone have the full opportunity to observe such changes. It is an old assumption that human joints are frictionless, that hyaline cartilages do not wear, and that slight injuries of joint structures are quickly repaired during customary periodic rests. Although complete repair might



Fig 1 A right supraspinatus tendon (above) reflected laterally and viewed from below, to show the marked fraying of the synovial membrane, the articular capsule and the undersurface of the tendon from contact with the wholly normal and smooth cartilaginous margin of the head of the humerus

chronic appendicitis. Some authors have grouped several of these signs as syndromes characteristic of the condition. Overend has made no attempt to draw definite conclusions but believes that the tentative deductions made by him demonstrate that there are principles on which a trustworthy examination of the appendix may be based.

ADOLPH HARTUNG M.D.

Hernaman Johnson F. The Place of X-rays in the Treatment of Certain Forms of Chronic Arthritis. *Brit J Radiol* 1937 10 765

Röntgen therapy has been found to be of definite value in certain forms of chronic arthritis but comparatively little has been done to classify the particular forms amenable to such treatment. Believing this to be essential for statistical purposes the author gives a detailed clinical and radiological description of those forms in which roentgen rays should be given a trial. For the limited purpose of arriving at a prognosis he classifies joint lesions into monarthritides and polyarthritides and divides the former into hypertrophic and infective forms.

He has found roentgen therapy especially valuable in hypertrophic cases except in the degenerative types affecting very old individuals in whom it is valueless. Even when the involved joint presents well marked changes and these remain stationary or appear to progress during treatment there may be definite improvement clinically, providing no predisposing factors are left out of account and the treatment is persisted in sufficiently.

The affected joint is given 150 roentgen twice a week for three weeks (first series). If some lessening of pain results the same treatment is continued for a further three weeks. If however no relief at all occurs the dosage in the second series of 12 treatments may be increased to 300 roentgen per sitting. The author uses 150 kv. 0.5 copper filter 40 cm. a.k. in distance a field of from 25 to 30 cm. in diameter and anteroposterior postero-anterior and lateral areas. At least a more full course of 12 sittings should be given at intervals of three months no matter how well the patient feels and thereafter less frequently for from two to three years. If improvement at the end of 12 weeks is small or absent

it is nevertheless desirable to persist as some cases showed real relief only after eight or nine months.

In cases of infective arthritis the dosage must be very carefully graded according to the amount of active inflammation present. In the chronic stages the same dosage may be used as in the hypertrophic form. Temporary improvement is perhaps the rule but genuine arrest is hard to attain.

In polyarthritides roentgen rays applied locally to individual joints may give some temporary relief but the progress of the disease is not checked.

ADOLPH HARTUNG M.D.

MISCELLANEOUS

Hartman F. W. Lesions of the Brain Following Fever Therapy. Etiology and Pathogenesis. *J Am M Ass* 1937 107 116

This study was undertaken in order to determine whether the lesions produced during the course of artificial fever therapy were due to asphyxia or anoxia. The material was from 1 human being who died and 12 experimental animals. In the latter careful blood studies were carried out which showed that there was marked diminution of the oxygen content of the animal's blood viz. the arterial blood showing an oxygen content of 15.59 per cent an oxygen carrying capacity of 26.63 per cent or an oxygen saturation of 59 per cent.

The minute cellular changes and the areas of necrosis observed in these brains after fever therapy are the histological changes observed after cerebral anoxia produced by ligation of the blood vessels carbon monoxide poisoning and asphyxia. Contributing factors to the anoxia include alkalosis of the blood due to rapid respirations increased temperature of the blood with decreased oxygen saturation increased basal metabolism with increased oxygen demand on the part of the tissues and very rapid flow of the blood through the tissues so that the oxygen is not given up in passing.

To combat these factors the use of oxygen during the period of treatment is recommended. It should be given by nasal catheter and in order to combat the alkalosis combinations of oxygen and carbon dioxide are suggested. JOHN WILFRIED EYRON M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

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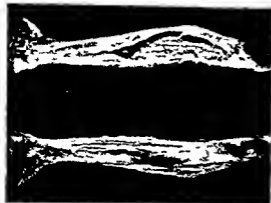


Fig. 2. A pair of biceps tendons illustrating the greater wear in the right (upper) tendon in right handed persons.

occur in such highly vascular structures as synovial bursae and articular capsules in the young regeneration in the practically avascular hyaline and fibrous cartilage is another matter. In any event the result depends upon the relative rates of repair and wear and only secondarily upon the age, vascularity, structure and nutrition of the organ in question. Healing cannot occur in avascular hyalinized separated tags of capsules, ligaments and tendons.

In regard to joint mice for example the violent movement causing and the acute symptoms accompanying them, as well as the pathological process present, are well known, but the facts that many joint mice are symptomless and that movement can increase their number are commonly overlooked. The microscopic and macroscopic particles contained in synovial fluid are not all derived from hyaline cartilage but come from the capsules, ligaments and fibrocartilage as well, and under unusual conditions may arise from the muscles. These particles like the larger joint mice also have a traumatic origin since they are the product of attrition.

The following changes, believed to have a similar origin, are described: (1) fraying and destruction of the walls of synovial bursae commonest in such superficial bursae as those overlying the olecranon and the patella and in such deep bursae as those above the shoulder (Figure 1); (2) fraying on the inner surfaces of articular capsules, the commonest change within joints which can be pronounced in a joint which is otherwise perfectly normal (Figure 2); (3) articular capsule defects, most frequent in the shoulder, the acromioclavicular and the hip joints; (4) destruction of ligaments, as the division occurring during the formation of large defects in the related portions of joint capsules; (5) fraying of muscles from movable contact with each other and from such contact with other structures through defects in joint capsules; (6) fraying and partial or total division of tendons, most commonly and seriously of the supraspinatus and the long tendon of the



Fig. 3. Fissuring of the hyaline articular cartilage on the distal extremity of a right femur with slight fraying of the former.

brachial biceps. (7) the gradual dislocation of tendons as in case of the long tendon of the biceps; (8) destruction of fibrocartilages, such as the almost universal fraying in later years of the inner margins of the glenoid fibrocartilages; (9) destruction of hyaline articular cartilages (Figure 3) as in the intercondylar regions of the femur and on the patella; (10) fissuring of the intervertebral discs, commonly present in the later decades; (11) erosion of bone with possible destruction of coapted bones to a depth of centimeters in such locations as the knee and hip joints; (12) rupture of the tendons; and (13) the formation of bony excrescences.

Important articular structures may be weakened or severed by the attrition accompanying ordinary routine movements in the course of daily life. The important factor is the frequency of the motion and not the greatness of the range. Healing whenever possible can occur only when the processes of repair exceed those of destruction. Probably even pronounced destruction can occur from attrition without severe pain if the rate of erosion is sufficiently slow. This does not imply that infection may not supervene.

WALTER H. NADLER, M.D.

Furth J, Kahn M G and Breedis C. The Transmission of Leucemia of Mice with a Single Cell. *Am J Cancer* 1937 31: 276.

Numerous experiments have been performed to determine the number of cells necessary for the

transmission of malignant tumors of mice. These studies indicate that more than 100,000 cells are necessary to transmit mouse carcinoma and mouse sarcoma. These experiments, however, have not been made with inbred animals, and it is probable that under favorable conditions a much smaller number of neoplastic cells would transmit the disease. The authors have found that under favorable conditions both lymphoid and myeloid leucemia can be transmitted with an estimated number of from 1 to 100 cells.

It seemed desirable to obtain more accurate information concerning the relation of the number of cells introduced to the duration of the disease and the character of the lesions produced. This information was obtained with the aid of the micro-manipulator and is the subject of this communication.

In the experiments described a small number of mice inoculated with single leucemic cells developed leucemia. These mice died within from fifteen to fifty days. This finding indicates that if leucemia results from the malignant transformation of a single normal leucocyte, the mice will die within that period. When mice received a dose larger than approximately 20 cells, all of them died of leucemia, but inoculations with smaller numbers of cells were successful only in a small percentage of the inoculated animals. This result may be explained by assuming that many of the cells used for inoculation were not viable, and that many cells were lost or injured during the process of inoculation. It may be assumed, furthermore, that not all cells are capable of reproduction and that cells which do not reach an organ favorable for their growth perish. The latter assumption is supported by the finding that with several strains of leucemia subcutaneous inoculations with a large number of cells fail to produce the disease, while intravenous inoculations made with a smaller number of cells are successful.

Attempts were made to transmit mouse leucemia with cell-free material and with injured cells, the cell-free material to be injected was examined microscopically and the cells were crushed while watched under the microscope. Failure to transmit the disease in these experiments supports the assumption that transmission of mouse leucemia is due to the implantation of living leucemic cells into susceptible hosts.

Leucemia may be explained by assuming that at least a single cell undergoes malignant transformation in an adult individual. In mice developing leucemia at the age of from seven to fifteen months, this transformation may take place within from four to seven weeks before the death of the animal. A single malignant white blood cell is capable of producing the systemic disease, leucemia, which has hitherto been regarded by many workers as having a multicentric origin. The transmission of mouse leucemia occurs as a result of the implantation of living malignant leucocytes.

JOSEPH K. NARAT, M D

Weiner, H. A.: *Paget's Disease of the Skin and Its Relation to Carcinoma of the Apocrine Sweat Glands.* *Am J Cancer*, 1937, 31: 373

Paget's disease, both mammary and extramammary, was first described in 1874, but its nature is still disputed. An instance of the disease occurring in the vulva of a woman eighty-four years old is reported with detailed necropsy findings. Of 57 other extramammary cases in the literature, no necropsy report is available and only 15 are reported in sufficient detail to warrant a definite diagnosis. An additional 10 are probably Paget's disease. The present case is strongly corroborative of the view of Jacobaeus, Muir, and others as to the nature of Paget's disease. They maintain that the skin lesion is the result of intra-epidermal metastases from an underlying cancer, i.e., the "Paget cell" is a cancer cell. All of the acceptable extramammary cases are located either in the axilla or anogenital region, sites in which the sweat glands are of the apocrine variety. The mammary glands are also modified sweat glands. It is suggested that Paget's disease of the skin is the intra-epidermal metastasis from an underlying carcinoma of the apocrine sweat glands. It is noteworthy that in the reported extramammary cases the carcinoma, whenever characterized, is described as glandular in type.

Is there more than a historical validity to justify the assumption that Paget's disease is either a clinical or pathological entity? It would be rash at the present time to give a definite answer, but even if the skin lesion is not completely *sur generis*, the view that this disease, which is linked with an underlying adenocarcinoma, and occurs at specific sites, such as the breast, axilla, and anogenital region, is a specific clinicopathological entity would seem to be warranted.

JOSEPH K. NARAT, M D

Welch, C. E., and Nathanson, I. T.: *Life Expectancy and Incidence of Malignant Disease. IV. Carcinoma of the Genito-Urinary Tract. V. Malignant Lymphoma, Fibrosarcoma, Malignant Melanoma, and Osteogenic Sarcoma.* *Am J Cancer*, 1937, 31: 586, 598

The average length of life in untreated cases of carcinoma of the cervix is fourteen months, of the bladder fourteen months, and of the prostate twelve months. The average length of life in all treated cases of carcinoma of the vulva is thirty months, of the vagina twenty-four months, of the cervix twenty-seven months, of the fundus of the uterus forty months, and of the ovary twenty-two months. The length of life remaining to young patients with carcinoma of the cervix is shorter than that remaining to older patients. Adeno-acanthoma, which is a mixed epidermoid and adenocarcinomatous growth, appears to be intermediate in malignancy between cancer of the cervix and cancer of the fundus of the uterus. The average length of life in treated cases of carcinoma of the penis is seventy-five months, of the testicle twenty-four months, of the prostate twenty-six months, of the

bladder twenty seven months, and of the kidney twenty two months

There appears to be no significant variation in the length of life remaining to patients with Hodgkin's disease and to those with other types of malignant lymphoma. The average length of life remaining in Hodgkin's disease is thirty months and in the other types, twenty four months. All malignant disease primary in the lymphatic system is considered under the heading of malignant lymphoma. This includes lymphocytomas, lymphosarcomas, Hodgkin's disease and the tumors diagnosed as giant follicular cell lymphoma of which there are very few examples.

The average length of life remaining to patients with chronic leucemia either lymphatic or myelogenous is about forty months. Acute lymphatic leucemia was more common than the acute myelogenous type in this series. Treatment prolongs the life of patients with malignant lymphoma about six months. The average length of life remaining to patients with fibrosarcoma is forty three months with malignant melanoma thirty nine months and with osteogenic sarcoma twenty one months. The prognosis in malignant lymphoma in the early years is slightly better for females than for males.

JOSEPH E. NABAT, M.D.

DUCTLESS GLANDS

Loesser, A. Hyperthyroidism and the Thyrotropic Hormone of the Hypophysis. *Proc. Roy. Soc. Med.*, Lond. 1937, 30: 2445.

Hyperthyroidism may be produced in two ways by the administration of the thyroid hormone and by the administration of the thyrotropic hormone of the anterior pituitary. The thyrotropic hormone when injected into the thyroids of young guinea pigs causes a decrease in the amount of colloid and a growth of the acinar cells resembling human Graves disease. It is inactive when given by mouth. Changes occur in from one half hour to twelve hours following the injection. There are no other hormones of the anterior pituitary lobe which produce changes of this type.

The thyrotropic hormone is standardized in Junkmann Shoeller or in Rowland Parkes units; the latter being thirteen times larger than the former. The injection of this hormone in guinea pigs causes a

rise in the basal metabolic rate of from 20 to 60 per cent, when injected in rats and humans the rise is 26 per cent within six to ten days. The glycogen content of the liver falls, but the blood sugar and muscle glycogen are little changed. Water, urea and sodium chloride are excreted and tachycardia is observed though none of these effects are observed in thyroidectomized animals.

The effectiveness of the hormone is limited. In hypophysectomized rats, for instance, the basal metabolic rate, which rose to plus 23 per cent, began to fall by the end of the first week and was minus 29 per cent after five weeks. The explanation for the phenomena varies. Some investigators believe that the thyroid becomes refractory to the thyrotropic hormone; others believe that the thyroxine, when liberated in excessive amounts, inhibits the secretion of the thyrotropic hormone by the pituitary, but because it was also observed in hypophysectomized animals, Collip and Anderson advanced the idea of antihormones. Antihormones can be clearly demonstrated in all animals after from four to nine weeks' treatment with the thyrotropic hormone, but are present in small quantities also in the blood of normal animals and human beings.

The anti thyrotropic hormone is not species specific. Its production is bound to the presence of thyroxine or of the thyroid. Iodine is without effect. This anti thyrotropic hormone is specific against thyrotropic hormones only. It does not inhibit other pituitary hormones, thyroid extract or thyroxine.

This dual protective mechanism, namely the decreasing of production of thyrotropic hormones by the pituitary and a production of antibodies can be overridden by an increase in the amounts of thyrotropic hormone which can lead to an increased and finally fatal hypothyroidism.

The size of the thyroid in these animals increased about 500 per cent, and even the adrenals increased 140 per cent. The basal metabolic rate increased 70 per cent and was maintained in some animals until death. The liver and kidneys showed a fatty degeneration and diffuse necrosis.

Hyperthyroid states can be conceivably produced by the pituitary either by a continuously increasing stimulation of the thyroid gland with the protective mechanism intact or by a constant stimulation with failure of the protective mechanism.

FRED S. MODERN, M.D.

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